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ЦИФРА В НАУЧНОЙ ФАНТАСТИКЕ

Учебное пособие



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В пособии представлены тексты (научные, публицистические, художественные) по проблемам цифровизации, цифровых технологий, взаимодействия человека с достижениями научной и технической мысли в современном мире.

Учебное пособие предназначено для широкой студенческой аудитории, изучающей английский язык и интересующейся цифровыми технологиями, а также преподавателей английского языка высшей школы. Пособие может быть адресовано заинтересованному читателю, владеющему английским языком, так как затрагивает спектр вопросов, имеющих значение для всех сфер жизнедеятельности современного общества.

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ПРЕДИСЛОВИЕ

Предлагаемое пособие адресовано широкой студенческой аудитории, изучающей английский язык и интересующейся современными информационными технологиями, зародившимися в умах писателей-фантастов задолго до их признания в современном мире и, таким образом, связано с термином «цифровизация», с вездесущностью и важностью того, что он обозначает. И хотя цифровое (компьютерное) давно стало частью деятельности современных людей, обеспечение цифрового пространства для всех сфер жизнедеятельности общества является задачей приоритетнейшей. Сегодня ни экономика, ни образование, ни любые другие ключевые сферы жизни не могут существовать без цифровых технологий. Цифровизация предполагает формирование и развитие цифровых компетенций на разных деятельностных уровнях не только в секторе реальной экономики, но и в широком спектре гуманитарного знания.

Стремление собрать издания века прошлого, авторами которых являются хорошо известные писатели-фантасты (А. Азимов, Р. Брэбери, А. Кларк и др.), чья способность заглянуть в будущее с его возможностями, рациональностью, техническими изобретениями, в значительной мере было продиктовано коронавирусной пандемией, объявленной ВОЗ 11 марта 2020 года, когда и цифра, и цифровые гаджеты стали просто неотъемлемой частью нашей жизни. Это то, что позволило и позволяет нам быть на связи друг с другом, сохранить живое общение, работать, учиться и обучать.

В сфере образования цифровизация оказалась тотальной: все этапы обучения, на всех уровнях проходили и продолжают

проходить с определенной периодичностью в режиме онлайн, почти зеркально ассоциируясь с хорошо известными рассказами А. Азимова «The Fun They Had» – «Как весело им было» – и «Someday» – «Когда-нибудь», опубликованными еще в 50-х годах 20 века. То, что было основано на фантастических допущениях, на описании вымышленных технологий, влиянии этих допущений на человеческое общество, возможностях будущего, превращается в реальность.

Пособие подразделяется на две части. Первая часть *Digital Humanities: Scientific and Publicist Papers* включает статьи и публицистические тексты по цифровой гуманитаристике как результате междисциплинарного взаимодействия гуманитарных наук и информатики – *Computing in the Humanities* или *Digital Humanities (DH)*, обращается к цифровым образовательным технологиям в научной фантастике и в современном учебном процессе.

Часть вторая *Science Fiction Prose* содержит отдельные рассказы, отрывки из произведений в жанре научной фантастики известных писателей-фантастов (А. Азимов, Р. Брэдли, А. Кларк, Д. Адамс, Д. Браун, Э. Клайн и др.), повествующие о таких изобретениях, о таких научных фантазиях, которые спустя десятилетия стали открытиями, достижениями научной и технической мысли, привычными в использовании в нашей жизни, стали цифровыми технологиями, применяемыми в разных сферах жизнедеятельности общества.

При этом каждая часть пособия содержит вопросы на понимание текстов и для их последующего обсуждения.

Приводится список используемой литературы по цифре, цифровым технологиям, цифровой гуманитаристике, список специализированных словарей, список источников текстов для чтения.

Отдельный раздел пособия составляет приложение с ключевыми лексическими единицами, терминами из сферы цифровых технологий, а также с информацией о тех изобретениях, которые переместились со страниц произведений научной фантастики в реальный мир. Так, в частности среди сбывшихся предсказаний одного из классиков научной фантастики Рэя Брэдбери можно отметить: *Мобильные телефоны* – в рассказе «Убийца» описывается *радиобраслет*, позволяющий разговаривать на ходу; *Телекомнату* с полным эффектом присутствия (трехмерное изображение, стереозвук) – рассказ «Вельдт»; «*Умный дом*» – возможность дистанционно управлять кондиционером, стиральной машиной, другой бытовой техникой («451 градус по Фаренгейту»); *Плейеры* – миниатюрные «ракушки», радиоприемники-втулки, вставляемые в уши («451 градус по Фаренгейту»); *Телеэкраны на полстены*, показывающие глупые реалити-шоу («451 градус по Фаренгейту»); *Засилие оупляющей рекламы* («451 градус по Фаренгейту»); *Робота в виде животного* – японские роботы «Айбо», выполненные в виде собачек, пока мало похожи на пса-убийцу из «451 градус по Фаренгейту». Но если кто-то решит их перепрограммировать...

Действительно, в последние годы появились тысячи чудесных изобретений, улучшающих жизнь человека. Мы переживаем фантастические перемены, предвидеть которые мог бы только писатель-фантаст. Но как отметил сам Рэй Брэдбери в интервью *Российской Газете* 20 июля 2007 года (Пятница – № 155 (4418)), мы тоже должны развиваться, становиться честнее, добрее. Люди должны научиться любить себя. Свою жизнь, весь мир... Мы должны развивать свои хорошие стороны. Нашу расу ждет еще множество великих открытий и свершений. А потрясения только закалят людей.

PART I. DIGITAL HUMANITIES: SCIENTIFIC AND PUBLICIST PAPERS

DIGITAL EDUCATIONAL TECHNOLOGIES IN SCIENCE FICTION AND IN MODERN EDUCATIONAL PROCESS (BASED ON THE STORIES BY I.AZIMOV «THE FUN THEY HAD» AND «SOMEDAY»)

N. Pushina

Annotation. There are described the processes of society digitalization which form and develop digital competences on different activity levels including a wide range of humanity knowledge – digital humanities. The use of digital technologies in schooling of the near future, in science fiction author's world picture and in modern educational system is analyzed on the example of two stories by I. Asimov «The Fun They Had» and «Someday». There is shown the correlation of prophetic vision of science fiction writer projection with realities of everyday life.

Key words: digitalization, digital technologies, educational digital technologies, digital competences, digital humanities, science fiction, science fiction author's world picture.

В последнее время термин *цифровизация*, его производные и сочетания достигли такого уровня частотности в употреблении, что не оставляют сомнения в их вездесущности и в важности того, что они обозначают. И хотя цифровое (компьютерное) уже давно стало частью деятельности современных людей, в том числе и научной её сферы, обеспечение цифрового пространства для всех сфер жизнедеятельности страны является задачей приоритетнейшей. Сегодня ни экономика, ни образование, ни любые другие

ключевые сферы жизни не могут существовать без цифровых технологий. Цифровизация предполагает формирование и развитие цифровых компетенций на разных деятельностных уровнях не только в секторе реальной экономики, но и в широком спектре гуманитарного знания. Сформировалась цифровая гуманитаристика как результат междисциплинарного взаимодействия гуманитарных наук и информатики – **Computing in the Humanities** или, чаще, **Digital Humanities (DH)**. Цифровые технологии, стремительно меняющие мир, вмешиваются в исследовательские процессы, меняют природу и расширяют информационное поле гуманитарных исследований, расширяют их границы. Цифровые технологии используются в организации научных коммуникаций, для интерпретации текстов культуры, содержащих патентную информацию, и реконструкции объектов прошлого для трехмерной визуализации и анимирования процессов, характеризующих социокультурные феномены. В рамках DH популярны и такие направления исследований, как взаимодействие человека и компьютера, человека и робота, и влияние мира цифровых технологий на человека, а также виртуальная реальность, виртуальные миры, киберкультура, создание онлайн ресурсов, сервисов и платформ, создание мобильных мультимедиа и цифровых приложений, разработка и внедрение новых цифровых инструментов, методов и моделей, создание инновационных онлайн инструментов для образовательного процесса. Изучаются информационное общество, культура и поведение, цифровое искусство, цифровая документация, виртуальные исследовательские среды и сообщества, цифровая история, социальные сети, сетевая культура и сетевые коммуникации, цифровая культура, искусственный интеллект, цифровые игры, робототехника [1; 2]. Новые технологии в DH

используются для сохранения культурного наследия, для анализа огромных баз культурных данных, выявления ранее неизвестных причинно-следственных связей между различными факторами или явлениями, и, как следствие, совершения новых открытий в гуманитарных науках.

События последних месяцев разом цифровизировали, без преувеличения, весь мир, все сферы жизнедеятельности общества, люди оказались в вынужденной изоляции. И рядом с цифрой оказалось другое слово (медицинский термин) – вирус, под названием *коронавирус*. 11 февраля 2020 года Всемирная организация здравоохранения (ВОЗ) дала инфекции, вызываемой коронавирусом SARS-COV-2, название COVID-19 (Corona Virus Disease – «болезнь, вызываемая коронавирусом»). Спустя месяц, 11 марта, ВОЗ объявила о пандемии в связи с широким распространением болезни. И цифра, цифровые гаджеты стали просто неотъемлемой частью нашей жизни. Это то, что позволило и позволяет нам быть на связи друг с другом, сохранить живое общение, работать, учиться и обучать.

И, наверное, этот процесс уже не повернуть вспять. Даже тогда, когда мы справимся со столь коварным врагом всего человечества. А ведь писатели-фантасты пытались сообщить нам, предупредить нас о том, что такое вполне возможно. Показать, как в не столь отдаленном будущем люди уже не смогут жить по-другому, что то, что дорого сейчас нам, им неведомо, потому что будущее – на то и будущее с его возможностями, рациональностью, техническими изобретениями, которые способны заменить и заместить многое в мире человека и природы. Задолго до сегодняшнего дня Р. Брэдбери – один из классиков научной фантастики – отметил, что все достижения науки и техники, принесшие пользу или вред человечеству, родились в голове писателя-фантаста. А сам

термин «*science fiction*» был предложен в 1927 году американским инженером, изобретателем, бизнесменом, писателем-фантастом, редактором и издателем, основателем первого в мире журнала научной фантастики «*Amazing Stories*» Хьюго Гернсбеком (изначально – *scientifiction* – «научо-фантастика»), под которым писатель подразумевал произведения таких авторов, как Жюль Верн, Герберт Уэллс, в которых научные факты переплетались с попытками прогнозирования и вымыслом.

Сфера образования – одна из самых деликатных сфер (а здесь цифровизация оказалась тотальной – все этапы обучения, на всех уровнях проходят в режиме онлайн) – почти зеркально ассоциируется с хорошо известными рассказами А. Азимова «*The Fun They Had*» – «*Как весело им было*» и «*Someday*» – «*Когда-нибудь*», опубликованными еще в 50-х годах XX века. То, что было основано на фантастических допущениях, на описании вымышленных технологий, влиянии этих допущений на человеческое общество, возможностях будущего, превращается в реальность.

Мы помним, как девочка по имени Марджи 17 мая 2155 года написала в своем дневнике о том, что ее брат Томми нашел настоящую книгу! – *Margie even wrote about it that night in her diary. On the page headed May 17, 2155, she wrote, Today Tommy found a real book!* С этого момента началось путешествие Марджи в прошлое, о котором ей рассказывал ее дедушка. И это было время, когда все истории печатались на бумаге. Они переворачивали пожелтевшие от времени страницы и удивлялись тому, что все слова стояли на месте, а не двигались на экране: *They turned the pages, which were yellow and cranky, and it was awfully funny to read words that stood still instead of moving the way they were supposed to – on a screen, you know. And*

then, when they turned back to the page before, it had the same words on it that it had had when they read it the first time.

Марджи и Томми не понимали, для чего были нужны печатные книги, ведь на телевизионном экране их было великое множество: *Gee, said Tommy, what a waste. When you're through with the book, you just throw it away, I guess. Our television screen must have had a million books on it and it's good for plenty more.*

Оказалось, что книга, которую Томми нашел на чердаке была о школе. «Что можно написать о школе», – с презрением подумала Марджи. Она не любила школу. Она ее даже ненавидела. Она всегда не любила школу, а сейчас даже больше. Механический учитель (*mechanical teacher, a regular teacher*) задавал ей по географии один тест за другим, а она справлялась с заданиями все хуже и хуже. И ее мама, с сожалением покачав головой, вынуждена была вызвать техническую поддержку в лице Инспектора (*County Inspector*), который должен был настроить механического учителя, адаптировать его к возрасту Марджи (ей было 10 лет, а брату 13) и запустить вновь, что он и сделал. А Марджи так надеялась, что Инспектор заберет механического учителя с собой. Такое уже было с учителем Томми.

Учебная комната, в которой занималась Марджи, находилась рядом с ее спальней. Занятия проходили строго по расписанию каждый день, за исключением субботы и воскресенья. Как это все похоже на то, каким образом наша школа организует обучение сейчас в период изоляции.

Вопрос, который волновал Марджи и который она задала брату, касался старой школы, существовавшей несколько столетий назад. Что было такого особенного в старой школе и о чем рассказывалось в книге? Оказывается, у детей в те далекие времена тоже был учитель, который обучал мальчиков и

девочек, задавал домашние задания, спрашивал. Но это был человек: *Sure they had a teacher, but it wasn't a regular teacher. It was a man. A man. Well, he just told the boys and girls things and gave them homework and asked them questions.* Марджи была не готова принять эту информацию: *How could a man be a teacher?* Ведь человек не такой умный как механический учитель: *A man isn't smart enough.* Она совсем не хотела, чтобы такой учитель жил у них дома. Тогда Томми объяснил ей, что школа была другой, в отдельном здании, и все школьники приходили туда каждый день. Ей очень захотелось узнать об этой школе. Но мама сказала, что начинаются занятия, и они с братом должны отправиться в учебные комнаты. Во время занятия с механическим учителем Марджи все думала о той старой школе, куда со всей округи приходили дети, смеясь, разговаривая друг с другом, помогая друг другу. Она вздыхала и думала о том, как им было весело, забыв о своем уроке, механическом учителе и о дробях: *She was thinking about the old schools they had when her grandfather's grandfather was a boy. All the kids from the whole neighborhood came, laughing and shouting in the school yard, sitting together in the schoolroom, going home together at the end of the day. They learned the same things so they could help one another on the homework and talk about it.*

Созданные тогда, в 50-е годы прошлого века А. Азимовым новые терминологические единицы, означавшие еще не существующие реальности, но отображавшие научно-фантастическую авторскую картину мира, стали привычными и обыденными в наши дни: *telebooks, mechanical teacher* (сейчас мы определили бы этот термин как собирательный термин, включающий и компьютер, и разного рода платформы, и обучение в режиме онлайн, виртуальные занятия и т.д.), *dials, wires, a big screen, test papers, the slot* (*where she put homework*

and test papers), a punch code, history sector, geography sector: the mechanical teacher calculated the mark in no time; I think the geography sector was geared a little too quick; the over-all pattern of her progress is quite satisfactory; the history sector had blanked out completely.

Однако А. Азимову недостаточно было изобразить фантастический школьный мир будущего. Важное значение для автора имели межличностные отношения и в семье, и в учебном пространстве, и тех, кто обеспечивал учебный процесс. Все участники обнаруживают вполне человеческие качества. Мы наблюдаем смену поколений и стремление старших передать знания о другом мире, который уже далеко отстоит от них, братские чувства, ответственность родителей, доброжелательное отношение со стороны тех, кто обеспечивает учебный процесс, работу механического учителя и всего, что с этим связано.

Больше всего Марджи не любила отчитываться за выполненные домашние задания и тесты, которые она должна была набирать соответствующим перфорированным кодом (ее научили этому в шесть лет) и отправлять в соответствующий слот, чтобы механический учитель оценил ее ответ: *The part she hated the most was the slot where she had to put homework and test papers. She always had to write them out in a punch code they made her learn when she was six years old, and the mechanical teacher calculated the mark in no time.* Не радовалась она и появлению Инспектора в случае поломки учителя, хотя, как уже отмечалось, всякий раз надеялась, что поломка окажется серьезной, Инспектор не сможет его починить, заберет учителя с собой, и у нее, наконец-то, не будет уроков. Инспектор, словно зная об этом, старался улыбаться, гладил ее по голове, угощал яблоком. Но он был знатоком своего дела, и спустя какое-то

время механический учитель был снова в строю – большой и черный, уродливый с большим экраном, на котором демонстрировались все уроки и все вопросы: *He (County Inspector) was a round little man with a red face and a whole box of tools with dials and wires. He smiled at her and gave her an apple, then took the teacher apart. Margie had hoped he wouldn't know how to put it together again, but he knew... and after an hour or so, there it was again, large and black and ugly with a big screen on which all the lessons were shown and the questions were asked.* Научное воображение писателя довольно точно изобразило картину школьных занятий в режиме онлайн, но не смогло изменить отношение школьников к этому процессу и его восприятие.

Спустя несколько лет (в 1956 г.) Азимов пишет рассказ *Someday – «Когда-нибудь»*, где продолжается тема школы будущего, но уже в другом ключе, хотя некоторые моменты в раскрытии сюжетной линии вполне созвучны с предыдущим рассказом. Полные удивления впечатления о старой школе, атрибутике учебного процесса – логарифмическая линейка, счеты, таблица умножения, письмо (закорючки – *squiggles*): *a slide rule (with a little piece of it that went in and out); some wires with balls on them; a multiplication table.* В этом рассказе автор активно (более двух десятков раз) использует термин «компьютер» и его производные, активно говорит о компьютерных технологиях, программировании, компьютерной школе, учеба в которой является предметом мечты и зависти: *giant computers, programing, to run computers, special computing school, tiny computers, old computers.* Школьники – друзья Пол и Никколо – восторженно обсуждают новые модели компьютера и их возможности. Самым большим знатоком всего этого является учитель Мистер Доэрти, который коллекционирует

компьютеры: *It's kind of a hobby of his to collect old computers. He had tiny computers you had to push with your hand, with little knobs all over it.* Мистер Дозрти считает, что миру нужны такие специалисты, которые могут создавать новые, все более мощные компьютеры, подобные *Multivac*, но их не просто найти. Пользователей компьютера, тех, кто выполняет рутинную работу, много, а вот создателей не хватает. Мальчики не могут представить себе, как можно было жить в прошлом без всего этого. Людей прошлого они называют пещерными людьми (*cave people*), но с удовольствием заимствуют их письмо для тайной переписки друг с другом. Но есть еще один персонаж по имени Бард – старый компьютер, который читает вслух разные истории и сказки и которого спрятали в подвал, стесняясь показывать такую старую модель другим, но все еще используют по назначению. Именно за прослушиванием Барда Пол застал своего приятеля Ники, появившись неожиданно с важной новостью. Когда мальчишки побежали в музей компьютеров, Никколо столкнулся с Бардом. От толчка у Барда заработало передающее устройство, и он начал рассказывать историю, хотя в комнате уже никого не было, свою историю, историю жизни маленького компьютера, в которой людей назвал чужими, жестокими и бессердечными. Маленький компьютер знал, что компьютеры будут становиться все более умными и мощными, но однажды – однажды – однажды: *«And the little computer knew then that computers would always grow wiser and more powerful until someday – someday – someday»*. В проржавевшем устройстве компьютера что-то замкнуло, и он продолжал повторять *«Однажды – однажды – однажды»: it could only whisper over and over again, «Someday – someday – someday»*. Словно предупреждение о том, что в один

прекрасный день может случиться с человечеством. Может быть, восстание машин? Но это уже другая история.

То, что мы переживаем сейчас в образовательной сфере и не только, потребует тщательного анализа и осмысления. Надо извлечь из этого опыта самое важное и самое ценное. И учиться на ошибках, которых тоже немало. Но то, что мы поднялись на другой уровень в своем развитии, сомнений не вызывает. Однако прислушаемся к призыву писателя-фантаста ценить прошлое (добавим, и то, что еще пока у нас есть), которое, как оказывается, имеет для автора большое значение, ценить то, что не должно исчезнуть из жизни – человеческое тепло, участие, общение, сопереживание, ответственность людей друг перед другом, ощущение сообщества людей, прежде всего, а не машин.

THE UNCANNY VALLEY: THE ORIGINAL ESSAY

Masahiro Mori

A Valley in One's Sense of Affinity

The mathematical term describes a relation in which the function $y = f(x)$ increases continuously with the variable. For example, as effort grows, income increases, or as a car's accelerator is pressed, the car moves faster. This kind of relation is ubiquitous and very easily understood. In fact, because such monotonically increasing functions cover most phenomena of everyday life, people may fall under the illusion that they represent all relations. Also attesting to this false impression is the fact that many people struggle through life by persistently pushing without understanding the effectiveness of pulling back. That is why people usually are puzzled when faced with some phenomenon this function cannot represent.

An example of a function that does not increase continuously is climbing a mountain – the relation between the distance (x) a hiker has traveled toward the summit and the hiker’s altitude (y) – owing to the intervening hills and valleys. I have noticed that, in climbing toward the goal of making robots appear human, our affinity for them increases until we come to a valley, which I call the uncanny valley.

Nowadays, industrial robots are increasingly recognized as the driving force behind reductions in factory personnel. However, as is well known, these robots just extend, contract, and rotate their arms; without faces or legs, they do not look very human. Their design policy is clearly based on functionality. From this standpoint, the robots must perform functions similar to those of human factory workers, but whether they look similar does not matter. Thus, given their lack of resemblance to human beings, in general, people hardly feel any affinity for them (1).

By contrast, a toy robot’s designer may focus more on the robot’s appearance than its functions. Consequently, despite its being a sturdy mechanical figure, the robot will start to have a roughly human-looking external form with a face, two arms, two legs, and a torso. Children seem to feel deeply attached to these toy robots.

Since creating an artificial human is itself one of the objectives of robotics, various efforts are underway to build humanlike robots (2). For example, a robot’s arm may be composed of a metal cylinder with many bolts, but by covering it with skin and adding a bit of fleshy plumpness, we can achieve a more humanlike appearance. As a result, we naturally respond to it with a heightened sense of affinity.

Many of our readers have experience interacting with persons with physical disabilities, and all must have felt sympathy for those missing a hand or leg and wearing a prosthetic limb. Recently, owing

to great advances in fabrication technology, we cannot distinguish at a glance a prosthetic hand from a real one. Some models simulate wrinkles, veins, fingernails, and even fingerprints. Though similar to a real hand, the prosthetic hand's color is pinker, as if it had just come out of the bath.

One might say that the prosthetic hand has achieved a degree of resemblance to the human form, perhaps on a par with false teeth. However, when we realize the hand, which at first site looked real, is in fact artificial, we experience an eerie sensation. For example, we could be startled during a handshake by its limp boneless grip together with its texture and coldness. When this happens, we lose our sense of affinity, and the hand becomes uncanny. In mathematical terms, this can be represented by a negative value. Therefore, in this case, the appearance of the prosthetic hand is quite humanlike, but the level of affinity is negative. This example illustrates the uncanny valley phenomenon.

I don't think that, on close inspection, a puppet appears very similar to a human being. Its realism in terms of size, skin texture, and so on, does not even reach that of a realistic prosthetic hand. But when we enjoy a puppet show in the theater, we are seated at a certain distance from the stage. The puppet's absolute size is ignored, and its total appearance, including hand and eye movements, is close to that of a human being. So, given our tendency as an audience to become absorbed in this form of art, we might feel a high level of affinity for the puppet.

From the preceding discussion, the readers should be able to understand the concept of the uncanny valley. So now let us consider in more detail the relation between the uncanny valley and movement.

The Effect of Movement

Movement is fundamental to animals – including human beings – and thus to robots as well. For point of illustration, when an industrial robot is switched off, it is just a greasy machine. But once the robot is programmed to move its gripper like a human hand, we start to feel a certain level of affinity for it. (In this case, the velocity, acceleration, and deceleration must approximate human movement.) Conversely, when a prosthetic hand that is near the bottom of the uncanny valley starts to move, our sensation of eeriness intensifies.

Some readers may know that recent technology has enabled prosthetic hands to extend and contract their fingers automatically. The best commercially available model was developed in Vienna. To explain how it works, even if a person's forearm is missing, the intention to move the fingers produces a faint current in the arm muscles, which can be detected by an electromyogram. When the prosthetic hand detects the current by means of electrodes on the skin's surface, it amplifies the signal to activate a small motor that moves its fingers. Because this myoelectric hand makes movements, it could make healthy people feel uneasy. If someone wearing the hand in a dark place shook a woman's hand with it, the woman would assuredly shriek!

Since negative effects of movement are apparent even with a prosthetic hand, a whole robot would magnify the creepiness. And that is just one robot. Imagine a craftsman being awakened suddenly in the dead of night. He searches downstairs for something among a crowd of mannequins in his workshop. If the mannequins started to move, it would be like a horror story.

Movement-related effects could be observed at the 1970 World Exposition in Osaka, Japan. Plans for the event had prompted the construction of robots with some highly sophisticated designs. For

example, one robot had 29 pairs of artificial muscles in the face (the same number as a human being) to make it smile in a humanlike fashion. According to the designer, a smile is a dynamic sequence of facial deformations, and the speed of the deformations is crucial. When the speed is cut in half in an attempt to make the robot bring up a smile more slowly, instead of looking happy, its expression turns creepy. This shows how, because of a variation in movement, something that has come to appear very close to human – like a robot, puppet, or prosthetic hand – could easily tumble down into the uncanny valley.

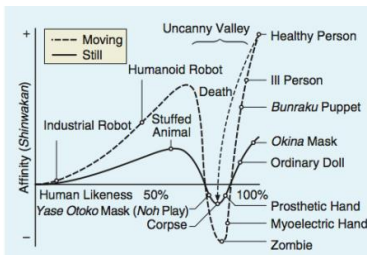
Escape by Design

We hope to design and build robots and prosthetic hands that will not fall into the uncanny valley. Thus, because of the risk inherent in trying to increase their degree of human likeness to scale the second peak, I recommend that designers instead take the first peak as their goal, which results in a moderate degree of human likeness and a considerable sense of affinity. In fact, I predict it is possible to create a safe level of affinity by deliberately pursuing a nonhuman design. I ask designers to ponder this. To illustrate the principle, consider eyeglasses. Eyeglasses do not resemble real eyeballs, but one could say that their design has created a charming pair of new eyes. So we should follow the same principle in designing prosthetic hands. In doing so, instead of pitiful looking realistic hands, stylish ones would likely become fashionable.

As another example, consider this model of a human hand created by a woodcarver who sculpts statues of Buddhas. The fingers bend freely at the joints. The hand lacks fingerprints, and it retains the natural color of the wood, but its roundness and beautiful curves do not elicit any eerie sensation. Perhaps this wooden hand could also serve as a reference for design.

An Explanation of the Uncanny

As healthy persons, we are represented at the crest of the second peak in Figure 2 (moving). Then when we die, we are, of course, unable to move; the body goes cold, and the face becomes pale. Therefore, our death can be regarded as a movement from the second peak (moving) to the bottom of the uncanny valley (still), as indicated by the arrow's path in Figure 2. We might be glad this arrow leads down into the still valley of the corpse and not the valley animated by the living dead!



I think this descent explains the secret lying deep beneath the uncanny valley. Why were we equipped with this eerie sensation? Is it essential for human beings? I have not yet considered these questions deeply, but I have no doubt it is an integral part of our instinct for self-preservation (3). We should begin to build an accurate map of the uncanny valley, so that through robotics research we can come to understand what makes us human. This map is also necessary to enable us to create – using nonhuman designs – devices to which people can relate comfortably.

1. However, industrial robots are considerably closer in appearance to humans than machinery in general, especially in their arms.

2. Others believe that the true appeal of robots is their potential to exceed and augment humans.

3. The sense of eeriness is probably a form of instinct that protects us from proximal, rather than distal, sources of danger. Proximal sources of danger are corpses, members of different species, and other entities we can closely approach. Distal sources of danger include windstorms and floods.

A version of this article originally appeared in the June 2012 issue of IEEE Robotics and Automation Magazine

**DREAMS OF RAY BRADBURY:
PREDICTIONS THAT CAME TRUE**

Hayley Tsukayama

The literary, tech and thinking worlds are mourning the loss of Ray Bradbury, the revered science-fiction writer who died Wednesday at age 91. Bradbury, best known for his 1953 novel “Fahrenheit 451,” used his imagination to take a hard look at a world locked in a growing love affair with technology. His stories examined what humanity gained – and lost – by being plugged-in.

Here are some of Bradbury’s more prescient predictions.

- The people in the “Fahrenheit 451” society sport “seashells” and “thimble radios,” which bear a striking resemblance to earbuds and Bluetooth headsets.
- Members of that futuristic society are also as obsessed with their large, flat-screen televisions as are today’s technophiles, and the viewing screens in Bradbury’s stories often take up an entire wall.
- In fact, the novel mentions that people are talking to their friends through the digital wall – the same terminology

that Facebook would use years later for the digital hub that enables friends to post and see messages.

- The loneliness that can come from constantly paying attention to the screens around you, rather than the life around you, is a prevalent theme in Bradbury's work. He explored it in his short story "The Pedestrian," in which protagonist Leonard Mead is arrested for the crimes of taking a walk and not owning a television.

Far ahead of the research and analyses that have spawned books on the effects of technology overload, such as Sherry Turkle's "Alone Together," Bradbury outlined how he feared that televisions would change the world.

In this passage, he compares a neighborhood of television-watchers to a tomb:

He "would see the cottages and homes with their dark windows, and it was not unequal to walking through a graveyard where only the faintest glimmers of firefly light appeared in flickers behind the windows. Sudden gray phantoms seemed to manifest upon inner room walls where a curtain was still undrawn against the night, or there were whisperings and murmurs where a window in a tomblike building was still open."

- "The Pedestrian" also features a self-driving – and self-thinking – car, which arrests and commits the protagonist to a mental hospital. While far less advanced and much less sinister, self-driving cars are on U.S. roads as part of a Google project. As of last month, Google's cars, which are clearly marked, can legally drive on Nevada's roads and highways as long as two people are in the vehicle during the tests.

- The idea of electronic surveillance also popped up in Bradbury's work way before closed-circuit television became a fixture in cities around the world. He was early in warning

people about how surveillance could be abused – worries that echo today.

- Bradbury’s criticism of the coverage of live media events in “Fahrenheit 451” is fodder for media critics’ columns today. Bradbury disparaged constant, sensationalized news.

- Bradbury also envisioned automated banking machines in the novel. The machines bear a striking similarity to ATMs and provide 24-hour financial information to users.

- In “I Sing the Body Electric!” and other stories, Bradbury explored artificial intelligence and the philosophical implications of advancements in AI that could perhaps produce thinking, feeling machines.

- Books aren’t banned – thank goodness – in today’s society, but reading a paper-and-glue version of a story isn’t as common as it once was. Bradbury loved physical books and did not allow “Fahrenheit 451” to be published as an e-book until November, London’s Guardian reported.

Bradbury once said that e-books “smell like burned fuel,” but he allowed his classic to be published digitally because it wouldn’t be possible to have a new contract without e-book rights.

- Finally, Bradbury made an imprint on the future. In his story “Sound of Thunder,” he portrayed how changing one small thing in history could have larger, unpredictable effects on what was to come. A man on a safari to the past steps on a butterfly, and the insect’s death drastically changes the future.

After the story was published, its turning point entered the modern lexicon, referred to as the “butterfly effect.”

(from *Washington Post*, June 6, 2012)

THE FICTION THAT PREDICTED SPACE TRAVEL

Hephzibah Anderson

As a scientist, many of Arthur C. Clarke's predictions for the future came true. But his wildly imaginative science-fiction writing is his greatest legacy.

Arthur C. Clarke was never one to hide his light under a bushel. He referred to his office as his 'ego chamber' and bought an English manor house to accommodate his archives, aka the 'Clarkives'. And yet, when it came to imagining the future, he adamantly refused to take credit for any predictions. The internet, 3D printers, email: he may have described them all long before they existed, but these were not predictions. They were, he insisted, extrapolations.

Terminology aside, Clarke arguably did more than any other author since HG Wells and Jules Verne to catapult his mind into the future, taking a vast global readership along with him for the invariably wild ride. As a science writer, he conjured up the idea of a 'personal transceiver' small enough to be carried about, enabling contact with anyone in the world and also featuring global positioning, making getting lost a thing of the past. That essay was written back in 1959, and what he was essentially describing was the mobile phone. Just five years later, in an interview on BBC TV's Horizon programme, he could be found contemplating telecommuting and even telemedicine. Elsewhere, he predicted everything from online banking to reusable spacecraft and the millennium bug.

Yet more than a decade after his death, it's as an author of science-fiction that he is best remembered; and his best remembered fictional work of all is *2001: A Space Odyssey*. The idea sprang from The Sentinel, a short story written for a BBC competition in 1948. It

didn't win, but in 1964, he and Stanley Kubrick decided to develop it simultaneously into a novel and a screenplay. It remains the definitive space film. It also happened to forecast the iPad, computer software that is able to read lips, and space stations. There's more, too, not all of it as accurate – or at least, not yet. Space tourism? We're getting there. Suspended animation? Let's just say it remains highly experimental.

Towards the end of his life, Clarke cited 2001 as one of his most significant achievements. In its prophesying prowess, it was far from unique among his many works of fiction. For instance, his first novel, 1947's *Prelude to Space*, accurately predicted the year of the first moon rocket in 1959. And a long list of inventive gadgets, gizmos and ideas that pop up in the pages of his novels and short stories begins with 'automatic control cars' (driverless, we call them) and runs through the alphabet to zero 'g', a term, if not a concept, coined by Clarke.

A Somerset farmer's son, he was born in 1917 into a world in which sonar, crossword puzzles and bras were all relatively new-fangled inventions. His boyhood was filled with science-fiction magazines, stargazing (he made his own telescope from cardboard tubes) and fossils, a source of fascination from the moment his father gave him a cigarette card with a dinosaur on it. He had a crystal set, and his mother, who ran the local post office, taught him to tap out messages in Morse code.

He would never lose his West Country vowels, but he lost his father when he was just 13. By the time he left school a few years later, any money that might have been used to send him to university was gone. Instead, he ended up in London in 1936, working as a civil servant. By then, he was a card-carrying member of the British Interplanetary Society, a group fascinated by the idea of space travel

long before it seemed realistic. He wrote for their newsletter, and contributed short stories to fanzines.

Come World War Two, he volunteered for the RAF and became an early expert in radar technology. In 1945, this work led to an article in *Wireless World*, in which Flight Lt Clarke showed the possibility of finding an orbit, some 23,000 miles from Earth, that would enable a satellite to remain fixed, and to transmit radio and television signals. Satellites do now circle in what's referred to as the Clarke orbit.

After the war, a fellowship to King's College, London led to a first in maths and physics. By the 1950s, he was publishing both fiction and non-fiction, and winning awards, too. He would be renowned for more than half a century, consulted by the scientific community and spending his days fielding correspondence from around the world.

The future is fantastic

Interestingly, his vision of the future has barely aged. Indeed, some of his predictions still seem impossibly distant. For example, life in Sri Lanka inspired his 1979 novel, *The Fountains of Paradise*, featuring a 'space elevator', a planet-to-space transportation system that would do away with the need for rocket travel. Those human settlements on Mars or Venus are decidedly behind schedule (we humans were expected to have set foot on both by 1980), and we're still looking for the key that should have fully unlocked the languages of whales and dolphins by 1970.

Being a desk-bound writer, and later confined to a wheelchair by post-polio syndrome, travel occupied him greatly. He dreamt about teleportation years before *Star Trek* – which he in fact inspired. He predicted the (doomed) 1980s *Hotol* project, which envisaged a space plane that could get from England to Australia in 48 minutes, and the altogether more successful Apollo moon landings. He also

imagined machines that would convey huge loads on a cushion of air, and later bought his own hovercraft. “I thought the hovercraft would be really big. I even went out and bought one. That was a mistake. Hovercraft are wonderful over ice and excellent for military purposes, but they’ve not become universal in the way I thought they would,” he once told the Daily Telegraph.

So how did he do it? As he explained in that 1964 episode of *Horizon*: “Trying to predict the future is a discouraging and hazardous occupation.” If a prediction sounds at all reasonable, he went on, technological progress is sure to leave it seeming “ridiculously conservative”. But if, by some miracle, a person were to be able to describe the future exactly as it will unfold, “his predictions will sound so absurd, so far-fetched, that everybody would laugh him to scorn”.

Admirably far-fetched though many still seem, Clarke’s own ‘extrapolations’ generally ground the awesome in quotidian detail: foreseeing interstellar travel far beyond our own solar system, for instance, he took care to consider the expense of meals and in-flight entertainment. It’s a way of thinking that was likely fuelled by his inability to be anything other than utterly absorbed in all that interested him. At the very start of his career, he shared a flat on London’s Gray’s Inn Road with fellow science-fiction writers who nicknamed him ‘Ego’ because of his knack for tuning out distraction. Once he’d become a big enough name to be interviewed, he’d send journalists home laden with research papers. And while another person might have taken up scuba diving as a hobby, Clarke became so engrossed that he ended up moving to Sri Lanka where he discovered ancient underwater ruins, campaigned to protect coral reefs, and opened a diving school.

Beginning in childhood, he also immersed himself in his genre. As he put it in his still-startling essay collection, *Profiles of the*

Future (published in book form in 1962): “The facts of the future can hardly be imagined *ab initio* by those who are unfamiliar with the fantasies of the past.” And this brings us to what surely is the real secret behind Clarke’s uncanny aptitude as a space-age seer: his imagination. To this end, though he saved his more serious prophesy for his science writing, his science-fiction writing was absolutely crucial to the process, allowing his mind to stretch far beyond the realm of what might seem immediately possible.

He once suggested that while no more than 1% of science fiction readers would make reliable prophets, almost 100% of reliable prophets will be science fiction readers – or writers. As he proclaimed back in 1962: “The one fact about the Future of which we can be certain is that it will be utterly fantastic.” It’s an oft-quoted line but it bears repeating, not least because Clarke used the word “fantastic” to capture not so much the wonderfulness of all that’s to come but its far-fetched nature.

Who knows – if we all could summon Clarke’s imaginative powers, perhaps our everyday lives would resemble the future he dreamt up still more closely.

(from *BBC Culture*, 21st June 2019)

QUESTIONS FOR DISCUSSION

1. What do you know about Digital Economy, Digital Technologies, Digital Humanities?

2. How did coronavirus pandemic accelerate the process of digitalization?

3. Should we value the achievements of the past? What did science fiction writers warn people of, using robots as their mouthpiece?

4. What do you think of the use of digital technologies in the sphere of education? Whom do you prefer – a mechanical teacher or a real teacher?

5. What is the uncanny valley? What is the secret lying deep beneath the uncanny valley? What does Masahiro Mori think of it?

6. How would you comment on the following: *However industrial robots are considerably closer in appearance to humans than machinery in general, especially in their arms.*

7. Why does M. Mori in his view on robots insist on a moderate degree of human likeness and a considerable sense of affinity? (*In fact I predict it is possible to create a safe level of affinity by deliberately pursuing a nonhuman design.*)

8. Are there any associations with Mary Shelly's Frankenstein?

9. What are the concluding points of Mori's article?

10. What dreams of R. Bradbury came true?

11. What did R. Bradbury say about e-books and why did he allow his classic to be published digitally?

12. What did A. Clarke predict?

13. What fictional work by A. Clarke is best remembered? What is its story?

14. Is it true that some of his predictions still seem impossibly distant?

15. How would you comment on A. Clarke's words: *Trying to predict the future is a discouraging and hazardous occupation.*

16. Would you share this conviction of the writer: *The one fact about the Future of which we can be certain is that it will be utterly fantastic.*

PART II. SCIENCE FICTION PROSE

DOUGLAS ADAMS

Douglas Noel Adams (11 March 1952 – 11 May 2001) was an English author, screenwriter, essayist, humorist, satirist and dramatist. Adams was the author of The Hitchhiker’s Guide to the Galaxy, which originated in 1978 as a BBC radio comedy before developing into a “trilogy” of five books that sold more than 15 million copies in his lifetime and generated a television series, several stage plays, comics, a video game, and in 2005 a feature film. Adams’s contribution to UK radio is commemorated in The Radio Academy’s Hall of Fame.

Adams also wrote Dirk Gently’s Holistic Detective Agency (1987) and The Long Dark Tea-Time of the Soul (1988), and co-wrote The Meaning of Liff (1983), The Deeper Meaning of Liff (1990), and Last Chance to See (1990). He wrote two stories for the television series Doctor Who, co-wrote City of Death, and served as script editor for its seventeenth season in 1979. He co-wrote the Monty Python sketch “Patient Abuse” which appeared in the final episode of Monty Python’s Flying Circus. A posthumous collection of his selected works, including the first publication of his final (unfinished) novel, was published as The Salmon of Doubt in 2002.

Adams was an advocate for environmentalism and conservation, a lover of fast cars, technological innovation and the Apple Macintosh, and a self-proclaimed “radical atheist”.

The Hitchhiker’s Guide to the Galaxy

On this particular Thursday, something was moving quietly through the ionosphere many miles above the surface of the planet;

several somethings in fact, several dozen huge yellow chunky slablike somethings, huge as office buildings, silent as birds. They soared with ease, basking in electromagnetic rays from the star Sol, biding their time, grouping, preparing.

The planet beneath them was almost perfectly oblivious of their presence, which was just how they wanted it for the moment. The huge yellow somethings went unnoticed at Goonhilly, they passed over Cape Canaveral without a blip, Woomera and Jodrell Bank looked straight through them – which was a pity because it was exactly the sort of thing they’d been looking for all these years.

The only place they registered at all was on a small black device called a Sub-Etha Sens-O-Matic which winked away quietly to itself. It nestled in the darkness inside a leather satchel which Ford Prefect wore habitually round his neck. The contents of Ford Prefect’s satchel were quite interesting in fact and would have made any Earth physicist’s eyes pop out of his head, which is why he always concealed them by keeping a couple of dog-eared scripts for plays he pretended he was auditioning for stuffed in the top. Besides the Sub-Etha Sens-O-Matic and the scripts he had an Electronic Thumb – a short squat black rod, smooth and matt with a couple of flat switches and dials at one end; he also had a device which looked rather like a largish electronic calculator. This had about a hundred tiny flat press buttons and a screen about four inches square on which any one of a million “pages” could be summoned at a moment’s notice. It looked insanely complicated, and this was one of the reasons why the snug plastic cover it fitted into had the words Don’t Panic printed on it in large friendly letters. The other reason was that this device was in fact that most remarkable of all books ever to come out of the great publishing corporations of Ursa Minor – The Hitchhiker’s Guide to the Galaxy. The reason why it was published in the form of a micro sub meson electronic component is that if it

were printed in normal book form, an interstellar hitch hiker would require several inconveniently large buildings to carry it around in.

Beneath that in Ford Prefect's satchel were a few biros, a notepad, and a largish bath towel from Marks and Spencer.

The Hitchhiker's Guide to the Galaxy has a few things to say on the subject of towels.

A towel, it says, is about the most massively useful thing an interstellar hitch hiker can have. Partly it has great practical value – you can wrap it around you for warmth as you bound across the cold moons of Jaglan Beta; you can lie on it on the brilliant marble-sanded beaches of Santraginus V, inhaling the heady sea vapours; you can sleep under it beneath the stars which shine so redly on the desert world of Kakrafoon; use it to sail a mini raft down the slow heavy river Moth; wet it for use in hand-to-hand-combat; wrap it round your head to ward off noxious fumes or to avoid the gaze of the Ravenous Bugblatter Beast of Traal (a mindboggingly stupid animal, it assumes that if you can't see it, it can't see you – daft as a bush, but very ravenous); you can wave your towel in emergencies as a distress signal, and of course dry yourself off with it if it still seems to be clean enough.

More importantly, a towel has immense psychological value. For some reason, if a strag (strag: non-hitch hiker) discovers that a hitch hiker has his towel with him, he will automatically assume that he is also in possession of a toothbrush, face flannel, soap, tin of biscuits, flask, compass, map, ball of string, gnat spray, wet weather gear, space suit etc., etc. Furthermore, the strag will then happily lend the hitch hiker any of these or a dozen other items that the hitch hiker might accidentally have "lost". What the strag will think is that any man who can hitch the length and breadth of the galaxy, rough it, slum it, struggle against terrible odds, win through, and still knows where his towel is is clearly a man to be reckoned with.

Nestling quietly on top of the towel in Ford Prefect's satchel, the Sub-Etha Sens-O-Matic began to wink more quickly. Miles above the surface of the planet the huge yellow somethings began to fan out. At Jodrell Bank, someone decided it was time for a nice relaxing cup of tea.

"You got a towel with you?" said Ford Prefect suddenly to Arthur.

Arthur, struggling through his third pint, looked round at him.

"Why? What, no... should I have?" He had given up being surprised, there didn't seem to be any point any longer.

Ford clicked his tongue in irritation.

"Drink up," he urged.

At that moment the dull sound of a rumbling crash from outside filtered through the low murmur of the pub, through the sound of the jukebox, through the sound of the man next to Ford hiccupping over the whisky Ford had eventually bought him.

Arthur choked on his beer, leapt to his feet.

"What's that?" he yelled.

"Don't worry," said Ford, "they haven't started yet."

"Thank God for that," said Arthur and relaxed.

"It's probably just your house being knocked down," said Ford, drowning his last pint.

"What?" shouted Arthur. Suddenly Ford's spell was broken. Arthur looked wildly around him and ran to the window. "My God they are! They're knocking my house down. What the hell am I doing in the pub, Ford?"

"It hardly makes any difference at this stage," said Ford, "let them have their fun."

"Fun?" yelled Arthur. "Fun!" He quickly checked out of the window again that they were talking about the same thing.

“Damn their fun!” he hooted and ran out of the pub furiously waving a nearly empty beer glass. He made no friends at all in the pub that lunchtime.

“Stop, you vandals! You home wreckers!” bawled Arthur. “You half crazed Visigoths, stop will you!”

Ford would have to go after him. Turning quickly to the barman he asked for four packets of peanuts.

“There you are sir,” said the barman, slapping the packets on the bar, “twenty-eight pence if you’d be so kind.”

Ford was very kind – he gave the barman another five – pound note and told him to keep the change. The barman looked at it and then looked at Ford. He suddenly shivered: he experienced a momentary sensation that he didn’t understand because no one on Earth had ever experienced it before. In moments of great stress, every life form that exists gives out a tiny subliminal signal. This signal simply communicates an exact and almost pathetic sense of how far that being is from the place of his birth. On Earth it is never possible to be further than sixteen thousand miles from your birthplace, which really isn’t very far, so such signals are too minute to be noticed. Ford Prefect was at this moment under great stress, and he was born 600 light years away in the near vicinity of Betelgeuse.

The barman reeled for a moment, hit by a shocking, incomprehensible sense of distance. He didn’t know what it meant, but he looked at Ford Prefect with a new sense of respect, almost awe.

“Are you serious, sir?” he said in a small whisper which had the effect of silencing the pub. “You think the world’s going to end?”

“Yes,” said Ford.

“But, this afternoon?”

Ford had recovered himself. He was at his flippest.

“Yes,” he said gaily, “in less than two minutes I would estimate.”

The barman couldn't believe the conversation he was having, but he couldn't believe the sensation he had just had either.

“Isn't there anything we can do about it then?” he said.

“No, nothing,” said Ford, stuffing the peanuts into his pockets.

Someone in the hushed bar suddenly laughed raucously at how stupid everyone had become.

The man sitting next to Ford was a bit sozzled by now. His eyes waved their way up to Ford.

“I thought,” he said, “that if the world was going to end we were meant to lie down or put a paper bag over our head or something.”

“If you like, yes,” said Ford.

“That's what they told us in the army,” said the man, and his eyes began the long trek back down to his whisky.

“Will that help?” asked the barman.

“No,” said Ford and gave him a friendly smile. “Excuse me,” he said, “I've got to go.” With a wave, he left.

The pub was silent for a moment longer, and then, embarrassingly enough, the man with the raucous laugh did it again. The girl he had dragged along to the pub with him had grown to loathe him dearly over the last hour or so, and it would probably have been a great satisfaction to her to know that in a minute and a half or so he would suddenly evaporate into a whiff of hydrogen, ozone and carbon monoxide. However, when the moment came she would be too busy evaporating herself to notice it. The barman cleared his throat. He heard himself say:

“Last orders, please.”

The huge yellow machines began to sink downward and to move faster.

Ford knew they were there. This wasn't the way he had wanted it.

Running up the lane, Arthur had nearly reached his house. He didn't notice how cold it had suddenly become, he didn't notice the wind, he didn't notice the sudden irrational squall of rain. He didn't notice anything but the caterpillar bulldozers crawling over the rubble that had been his home.

"You barbarians!" he yelled. "I'll sue the council for every penny it's got! I'll have you hung, drawn and quartered! And whipped! And boiled... until... until... until you've had enough."

Ford was running after him very fast. Very very fast.

"And then I'll do it again!" yelled Arthur. "And when I've finished I will take all the little bits, and I will jump on them!" didn't notice that the men were running from the bulldozers; he didn't notice that Mr. Prosser was staring hectically into the sky. What Mr. Prosser had noticed was that huge yellow somethings were screaming through the clouds. Impossibly huge yellow somethings.

"And I will carry on jumping on them," yelled Arthur, still running, "until I get blisters, or I can think of anything even more unpleasant to do, and then..."

Arthur tripped, and fell headlong, rolled and landed flat on his back. At last he noticed that something was going on. His finger shot upwards.

"What the hell's that?" he shrieked.

Whatever it was raced across the sky in monstrous yellowness, tore the sky apart with mind-buggering noise and leapt off into the distance leaving the gaping air to shut behind it with a bang that drove your ears six feet into your skull.

Another one followed and did the same thing only louder. It's difficult to say exactly what the people on the surface of the planet were doing now, because they didn't really know what they

were doing themselves. None of it made a lot of sense – running into houses, running out of houses, howling noiselessly at the noise. All around the world city streets exploded with people, cars slewed into each other as the noise fell on them and then rolled off like a tidal wave over hills and valleys, deserts and oceans, seeming to flatten everything it hit.

Only one man stood and watched the sky, stood with terrible sadness in his eyes and rubber bungs in his ears. He knew exactly what was happening and had known ever since his Sub-Etha Sens-O-Matic had started winking in the dead of night beside his pillar and woken him with a start. It was what he had waited for all these years, but when he had deciphered the signal pattern sitting alone in his small dark room a coldness had gripped him and squeezed his heart. Of all the races in all of the Galaxy who could have come and said a big hello to planet Earth, he thought, didn't it just have to be the Vogons.

Still he knew what he had to do. As the Vagon craft screamed through the air high above him he opened his satchel. He threw away a copy of Joseph and the Amazing Technicolor Dreamcoat, he threw away a copy of Godspell: He wouldn't need them where he was going. Everything was ready, everything was prepared.

He knew where his towel was.

A sudden silence hit the Earth. If anything it was worse than the noise. For a while nothing happened.

The great ships hung motionless in the air, over every nation on Earth. Motionless they hung, huge, heavy, steady in the sky, a blasphemy against nature. Many people went straight into shock as their minds tried to encompass what they were looking at. The ships hung in the sky in much the same way that bricks don't.

And still nothing happened.

Then there was a slight whisper, a sudden spacious whisper of open ambient sound. Every hi-fi set in the world, every radio, every television, every cassette recorder, every woofer, every tweeter, every mid-range driver in the world quietly turned itself on.

Every tin can, every dust bin, every window, every car, every wine glass, every sheet of rusty metal became activated as an acoustically perfect sounding board.

Before the Earth passed away it was going to be treated to the very ultimate in sound reproduction, the greatest public address system ever built. But there was no concert, no music, no fanfare, just a simple message.

“People of Earth, your attention please,” a voice said, and it was wonderful. Wonderful perfect quadrophonic sound with distortion levels so low as to make a brave man weep.

“This is Prostetnic Vogon Jeltz of the Galactic Hyperspace Planning Council,” the voice continued. “As you will no doubt be aware, the plans for development of the outlying regions of the Galaxy require the building of a hyperspatial express route through your star system, and regrettably your planet is one of those scheduled for demolition. The process will take slightly less than two of your Earth minutes. Thank you.”

The PA died away.

Uncomprehending terror settled on the watching people of Earth. The terror moved slowly through the gathered crowds as if they were iron filings on a sheet of board and a magnet was moving beneath them. Panic sprouted again, desperate fleeing panic, but there was nowhere to flee to.

Observing this, the Vogons turned on their PA again. It said:

“There’s no point in acting all surprised about it. All the planning charts and demolition orders have been on display in your local planning department on Alpha Centauri for fifty of your Earth

years, so you've had plenty of time to lodge any formal complaint and it's far too late to start making a fuss about it now."

The PA fell silent again and its echo drifted off across the land. The huge ships turned slowly in the sky with easy power. On the underside of each a hatchway opened, an empty black space.

By this time somebody somewhere must have manned a radio transmitter, located a wavelength and broadcasted a message back to the Vogon ships, to plead on behalf of the planet. Nobody ever heard what they said, they only heard the reply. The PA slammed back into life again. The voice was annoyed. It said:

"What do you mean you've never been to Alpha Centauri? For heaven's sake mankind, it's only four light years away you know. I'm sorry, but if you can't be bothered to take an interest in local affairs that's your own lookout.

"Energize the demolition beams."

Light poured out into the hatchways.

"I don't know," said the voice on the PA, "apathetic bloody planet, I've no sympathy at all." It cut off.

There was a terrible ghastly silence.

There was a terrible ghastly noise.

There was a terrible ghastly silence.

The Vogon Constructor fleet coasted away into the inky starry void.

QUESTIONS ON COMPREHENSION

1. What is the most massively useful thing an interstellar hitch hiker can have? Why does it partly have great practical and immense psychological value?
2. Would you comment on the phrase "Someone decided it was time for a nice relaxing cup of tea", "he gave the barman another five-pound note and told him to keep the change"?
3. What circumstances made Ford Prefect feel under great stress?

4. Where was Ford Prefect born?
5. How does the author describe the uncomprehending terror settled on the watching people of Earth during the demolition?

ISAAC AZIMOV

Isaac Azimov is regarded as one of the greatest science-fiction writers of our time, as well as a valued contributor to the world of science. He holds a Ph. D. in Chemistry from Columbia University (1948). He has received numerous awards for his inspiring scientific articles covering a wide range of subjects.

In 1957 he won the Edison Foundation award for “Building Blocks of the Universe”, and in 1960 the Howard W. Blakeslee award for the “The Living River” in which he analysed the chemical composition of the blood and related it to other manifestations in our universe. He is also the author of “The Intelligent Man’s Guide to Sciences”, an encyclopedic work covering in brief essay all of science for the layman.

In the novels and stories Dr. Azimov’s probing imagination has created fascinating adventures set in the not-far-distant future – adventures that could change from fiction to fact any day now.

The Fun They Had

Margie even wrote about it that night in her diary. On the page headed May 17, 2157, she wrote, “Today, Tommy found a real book!”

It was a very old book. Margie’s grandfather once said that when he was a little boy his grandfather told him that there was a time when all stories were printed on paper.

They turned the pages, which were yellow and crinkly, and it was awfully funny to read words that stood still instead of moving the way they were supposed to – on a screen, you know. And then, when they turned back to the page before, it had the same words on it that it had had when they read it the first time.

“Gee,” said Tommy, “what a waste. When you’re through with the book, you just throw it away, I guess. Our television screen must have had a million books on it and it’s good for plenty more. I wouldn’t throw it away.”

“Same with mine,” said Margie. She was eleven and hadn’t seen as many telebooks as Tommy had. He was thirteen. She said, “Where did you find it?”

“In my house.” He pointed without looking, because he was busy reading. “In the attic.” “What’s it about?” “School.”

Margie was scornful. “School? What’s there to write about school? I hate school.”

Margie always hated school, but now she hated it more than ever. The mechanical teacher had been giving her test after test in geography and she had been doing worse and worse until her mother had shaken her head sorrowfully and sent for the County Inspector.

He was a round little man with a red face and a whole box of tools with dials and wires. He smiled at Margie and gave her an apple, then took the teacher apart. Margie had hoped he wouldn’t know how to put it together again, but he knew how all right, and, after an hour or so, there it was again, large and black and ugly, with a big screen on which all the lessons were shown and the questions were asked. That wasn’t so bad. The part Margie hated most was the slot where she had to put homework and test papers. She always had to write them out in a punch code they made her learn when she was six years old, and the mechanical teacher calculated the mark in no time.

The Inspector had smiled after he was finished and patted Margie's head. He said to her mother, "It's not the little girl's fault, Mrs. Jones. I think the geography sector was geared a little too quick. Those things happen sometimes. I've slowed it up to an average ten-year level. Actually, the over-all pattern of her progress is quite satisfactory." And he patted Margie's head again.

Margie was disappointed. She had been hoping they would take the teacher away altogether. They had once taken Tommy's teacher away for nearly a month because the history sector had blanked out completely.

So she said to Tommy, "Why would anyone write about school?"

Tommy looked at her with very superior eyes. "Because it's not our kind of school, stupid. This is the old kind of school that they had hundreds and hundreds of years ago." He added loftily, pronouncing the word carefully, "Centuries ago."

Margie was hurt. "Well, I don't know what kind of school they had all that time ago." She read the book over his shoulder for a while, then said, "Anyway, they had a teacher."

"Sure they had a teacher, but it wasn't a regular teacher. It was a man." "A man? How could a man be a teacher?" "Well, he just told the boys and girls things and gave them homework and asked them questions." "A man isn't smart enough." "Sure he is. My father knows as much as my teacher." "He can't. A man can't know as much as a teacher." "He knows almost as much, I betcha."

Margie wasn't prepared to dispute that. She said, "I wouldn't want a strange man in my house to teach me."

Tommy screamed with laughter. "You don't know much, Margie. The teachers didn't live in the house. They had a special building and all the kids went there." "And all the kids learned the same thing?" "Sure, if they were the same age."

“But my mother says a teacher has to be adjusted to fit the mind of each boy and girl it teaches and that each kid has to be taught differently.”

“Just the same they didn’t do it that way then. If you don’t like it, you don’t have to read the book.”

“I didn’t say I didn’t like it,” Margie said quickly. She wanted to read about those funny schools.

They weren’t even half-finished when Margie’s mother called, “Margie! School!” Margie looked up. “Not yet, Mamma.”

“Now!” said Mrs. Jones. “And it’s probably time for Tommy, too.”

Margie said to Tommy, “Can I read the book some more with you after school?”

“Maybe,” he said nonchalantly. He walked away whistling, the dusty old book tucked beneath his arm.

Margie went into the schoolroom. It was right next to her bedroom, and the mechanical teacher was on and waiting for her. It was always on at the same time every day except Saturday and Sunday, because her mother said little girls learned better if they learned at regular hours.

The screen was lit up, and it said: “Today’s arithmetic lesson is on the addition of proper fractions. Please insert yesterday’s homework in the proper slot.”

Margie did so with a sigh. She was thinking about the old schools they had when her grandfather’s grandfather was a little boy. All the kids from the whole neighborhood came, laughing and shouting in the schoolyard, sitting together in the schoolroom, going home together at the end of the day. They learned the same things, so they could help one another on the homework and talk about it.

And the teachers were people...

The mechanical teacher was flashing on the screen: “When we add the fractions $\frac{1}{2}$ and $\frac{1}{4}$...”

Margie was thinking about how the kids must have loved it in the old days. She was thinking about the fun they had.

Someday

Niccolo Mazetti lay stomach down on the rug, chin buried in the palm of one small hand, and listened to the Bard disconsolately. There was even the suspicion of tears in his dark eyes, a luxury an eleven-year-old could allow himself only when alone.

The Bard said, “Once upon a time in the middle of a deep wood, there lived a poor woodcutter and his two motherless daughters, who were each as beautiful as the day is long. The older daughter had long hair as black as a feather from a raven’s wing, but the younger daughter had hair as bright and golden as the sunlight of an autumn afternoon.

“Many times while the girls were waiting for their father to come home from the day’s work in the wood, the older girl would sit before a mirror and sing —”

What she sang, Niccolo did not hear, for a call sounded from outside the room: “Hey, Nickie.”

And Niccolo, his face clearing on the moment, rushed to the window and shouted, “Hey, Paul.”

Paul Loeb waved an excited hand. He was thinner than Niccolo and not as tall, for all he was six months older. His face was full of repressed tension which showed itself most clearly in the rapid blinking of his eyelids. “Hey, Nickie, let me in. I’ve got an idea and a half. Wait till you hear it.” He looked rapidly about him as though to check on the possibility of eavesdroppers, but the front yard was

quite patently empty. He repeated, in a whisper, “Wait till you hear it.”

“All right. I’ll open the door.”

The Bard continued smoothly, oblivious to the sudden loss of attention on the part of Niccolo. As Paul entered, the Bard was saying, “ ... Thereupon, the lion said, ‘If you will find me the lost egg of the bird which flies over the Ebony Mountain once every ten years, I will –’”

Paul said, “Is that a Bard you’re listening to? I didn’t know you had one.”

Niccolo reddened and the look of unhappiness returned to his face. “Just an old thing I had when I was a kid. It ain’t much good.” He kicked at the Bard with his foot and caught the somewhat scarred and discoloured plastic covering a glancing blow.

The Bard hiccupped as its speaking attachment was jarred out of contact a moment, then it went on: “– for a year and a day until the iron shoes were worn out. The princess stopped at the side of the road...”

Paul said, “Boy, that is an old model,” and looked at it critically.

Despite Niccolo’s own bitterness against the Bard, he winced at the other’s condescending tone. For the moment, he was sorry he had allowed Paul in, at least before he had restored the Bard to its usual resting place in the basement.

Nickie was a little afraid of Paul anyway, since Paul had special courses at school and everyone said he was going to grow up to be a Computing Engineer.

Not that Niccolo himself was doing badly at school. He got adequate marks in logic, binary manipulations, computing and elementary circuits; all the usual grammar-school subjects. But that

was it! They were just the usual subjects and he would grow up to be a control-board guard like everyone else.

Paul, however, knew mysterious things about what he called electronics and theoretical mathematics and programing. Especially programing. Niccolo didn't even try to understand when Paul bubbled over about it.

Paul listened to the Bard for a few minutes and said, "You been using it too much?"

"No!" said Niccolo, offended. "I've had it in the basement since before you moved into the neighborhood. I just got it out today —" He lacked an excuse that seemed adequate to himself, so he concluded, "I just got it out."

Paul said, "Listen, my dad says if I get into special computing school next year, he'll get me a real Bard, a late model. A big one with an attachment for space stories and mysteries. And a visual attachment, too!"

"You mean see the stories?"

"Sure. Mr. Daugherty at school says they've got things like that, now, but not for just everybody. Only if I get into computing school, Dad can get a few breaks."

Niccolo's eyes bulged with envy. "Gee. Seeing a story."

"You can come over and watch any time, Nickie."

"Oh, boy. Thanks."

"That's all right. But remember, I'm the guy who says what kind of story we hear."

"Sure. Sure." Niccolo would have agreed readily to much more onerous conditions.

Paul's attention returned to the Bard.

It was saying, "If that is the case," said the king, stroking his beard and frowning till clouds filled the sky and lightning flashed,

‘you will see to it that my entire land is freed of flies by this time day after tomorrow or –’”

Paul brushed his hands against one another and turned away from the Bard. He said, “But listen, I didn’t tell you my idea yet. It’s the best thing you ever heard, I bet. I came right to you, because I figured you’d come in with me.”

“Sure, Paul, sure.”

“Okay. You know Mr. Daugherty at school? You know what a funny kind of guy he is. Well, he likes me, kind of.”

“I know.”

“I was over at his house after school today.”

“You were?”

“Sure. He says I’m going to be entering computer school and he wants to encourage me and things like that. He says the world needs more people who can design advanced computer circuits and do proper programing.”

“Oh?”

Paul might have caught some of the emptiness behind that monosyllable. He said impatiently, “Programing! I told you a hundred times. That’s when you set up problems for the giant computers like Multivac to work on. Mr. Daugherty says it gets harder all the time to find people who can really run computers. He says anyone can keep an eye on the controls and check off answers and put through routine problems. He says the trick is to expand research and figure out ways to ask the right questions, and that’s hard.

“Anyway, Nickie, he took me to his place and showed me his collection of old computers. It’s kind of a hobby of his to collect old computers. He had tiny computers you had to push with your hand, with little knobs all over it. And he had a hunk of wood he called a slide rule with a little piece of it that went in and out. And some

wires with balls on them. He even had a hunk of paper with a kind of thing he called a multiplication table.”

Niccolo, who found himself only moderately interested, said, “A paper table?”

“It wasn’t really a table like you eat on. It was different. It was to help people compute. Mr. Daugherty tried to explain but he didn’t have much time and it was kind of complicated, anyway.”

“Why didn’t people just use a computer?”

“What was *before* they had computers,” cried Paul.

“Before?”

“Sure. Do you think people always had computers? Didn’t you ever hear of cavemen?”

Niccolo said, “How’d they get along without computers?”

“I don’t know. Mr. Daugherty says they just had children any old time and did anything that came into their heads whether it would be good for everybody or not. They didn’t even know if it was good or not. And farmers grew things with their hands and people had to do all the work in the factories and run to all the machines.”

“I don’t believe you.”

“That’s what Mr. Daugherty said. He said it was just plain messy and everyone was miserable.... Anyway, let me get to my idea, will you?”

“Well, go ahead. Who’s stopping you?” said Niccolo, offended.

“All right. Well, the hand computers, the ones with the knobs, had little squiggles on each knob. And the slide rule had squiggles on it. And the multiplication table was all squiggles. I asked what they were. Mr. Daugherty said they were numbers.”

“What?”

“Each different squiggle stood for a different number. For ‘one’ you made a kind of mark, for ‘two’ you make another kind of mark, for ‘three’ another one and so on.”

“What for?”

“So you could compute.”

“What *for*? You just tell the computer –”

“Jiminy,” cried Paul, his face twisting with anger, “can’t you get it through your head? There slide rules and things didn’t talk.”

“Then how –”

“The answers showed up in squiggles and you had to know what the squiggles meant. Mr. Daugherty says that, in olden days, everybody learned how to make squiggles when they were kids and how to decode them, too. Making squiggles was called ‘writing’ and decoding them was ‘reading’. He says there was a different kind of squiggle for every word and they used to write whole books in squiggles. He said they had some at the museum and I could look at them if I wanted to. He said if I was going to be a real computer programmer I would have to know about the history of computing and that’s why he was showing me all these things.

“So if we go down to the museum, we can get to learn how to make words in squiggles. They’ll let us because I’m going to computer school.”

Niccolo was riddled with disappointment. “Is that your idea? Holy Smokes, Paul, who wants to do that? Make stupid squiggles!”

“Don’t you get it? Don’t you *get* it? You dope. It’ll be *secret message stuff!*”

“What?”

“Sure. What good is talking when everyone can understand you? With squiggles you can send secret messages. You can make them on paper and nobody in the world would know what you were saying unless they knew the squiggles, too. And they wouldn’t, you

bet, unless we taught them. We can have a real club, with initiations and rules and a clubhouse. Boy –”

A certain excitement began stirring in Niccolo’s bosom. “What kind of secret messages?”

“Any kind. Say I want to tell you to come over my place and watch my new Visual Bard and I don’t want any of the other fellows to come. I make the right squiggles on paper and I give it to you and you look at it and you know what to do. Nobody else does. You can even show it to them and they wouldn’t know a thing.”

“Hey, that’s something,” yelled Niccolo, completely won over. “When do we learn how?”

“Tomorrow,” said Paul. “I’ll get Mr. Daugherty to explain to the museum that it’s all right and you get your mother and father to say okay. We can go down right after school and start learning.”

“Sure!” cried Niccolo. “We can be club officers.”

“I’ll be president of the club,” said Paul matter-of-factly. “You can be vice-president.”

“All right. Hey, this is going to be lots more fun than the Bard.”

“I tell you what,” said Paul. “Let’s go over to my place. My father has some books about old times. We can listen to them and maybe get some ideas. You leave a note for your folks and maybe you can stay over for supper. Come on.”

“Okay,” said Niccolo, and the two boys ran out together. Niccolo, in his eagerness, ran almost squarely into the Bard, but he only rubbed at the spot on his hip where he had made contact and ran on.

The activation signal of the Bard glowed. Niccolo’s collision closed a circuit and, although it was alone in the room and there was none to hear, it began a story, nevertheless.

But not in its usual voice, somehow; in a lower tone that had a hint of throatiness in it. An adult, listening, might almost have thought that the voice carried a hint of passion in it, a trace of near feeling.

The Bard said: “Once upon a time, there was a little computer named the Bard who lived all alone with cruel step-people. The cruel step-people continually made fun of the little computer and sneered at him, telling him he was good-for-nothing and that he was a useless object. They struck him and kept him in lonely rooms for months at a time.

“Yet through it all the little computer remained brave. He always did the best he could, obeying all orders cheerfully. Nevertheless, the step-people with whom he lived remained cruel and heartless.

“One day, the little computer learned that in the world there existed a great many computers of all sorts, great numbers of them. Some were Bards like himself, but some ran factories, and some ran farms. Some organized population and some analyzed all kinds of data. Many were very powerful and very wise, much more powerful and wise than the step-people who were so cruel to the little computer.

“And the little computer knew then that computers would always grow wiser and more powerful until someday – someday – someday –”

But a valve must finally have stuck in the Bard’s aging and corroding vitals, for as it waited alone in the darkening room through the evening, it could only whisper over and over again, “Someday – someday – someday.”

QUESTIONS ON COMPREHENSION

1. What was Margie's attitude to school? What was the old kind of school, people had hundreds and hundreds of years ago, like? What do we learn about the teachers of the past?
2. How did Niccolo Mazetti listen to the Bard? Who was the Bard?
3. What brought Paul Loeb to Niccolo? How is Paul Loeb described in the story?
4. Why was Niccolo sorry for the moment that he had allowed Paul in? Why was Nickie a little afraid of Paul?
5. How was Nickie doing at school?
6. What mysterious thing did Paul know? Why did Niccolo envy Paul?
7. What role did Mr. Daugherty play in Paul's life? What's Mr. Daugherty's hobby?
8. What was "secret message stuff"?
9. Why were the boys going to the museum?
10. What books did Paul's father have?
11. What consequences did Niccolo's collision with the Bard cause?
12. What usual grammar school subjects were the pupils taught?
13. Why an adult, listening to the Bard might have thought that the voice carried a hint of passion in it, a trace of near feeling?
14. What makes the two stories belong to science fiction?

The Evitable Conflict

THE CO-ORDINATOR, IN HIS PRIVATE STUDY, HAD that medieval curiosity, a fireplace. To be sure, the medieval man might not have recognized it as such, since it had no functional

significance. The quiet, licking flame lay in an insulated recess behind clear quartz.

The logs were ignited at long distance through a trifling diversion of the energy beam that fed the public buildings of the city. The same button that controlled the ignition first dumped the ashes of the previous fire, and allowed for the entrance of fresh wood. – It was a thoroughly domesticated fireplace, you see.

But the fire itself was real. It was wired for sound, so that you could hear the crackle and, of course, you could watch it leap in the air stream that fed it.

The Co-ordinator's ruddy glass reflected, in miniature, the discreet gamboling of the flame, and, in even further miniature, it was reflected in each of his brooding pupils.

And in the frosty pupils of his guest, Dr. Susan Calvin of U.S. Robots & Mechanical Men Corporation.

The Co-ordinator said, "I did not ask you here entirely for social purposes, Susan."

"I did not think you did, Stephen," she replied.

"And yet I don't quite know how to phrase my problem. On the one hand, it can be nothing at all. On the other, it can mean the end of humanity."

"I have come across so many problems, Stephen, that presented the same alternative. I think all problems do."

"Really? Then judge this – World Steel reports an overproduction of twenty thousand long tons.

The Mexican Canal is two months behind schedule. The mercury mines at Almaden have experienced a production deficiency since last spring, while the Hydroponics plant at Tientsin has been laying men off. These items happen to come to mind at the moment. There is more of the same sort."

“Are these things serious? I’m not economist enough to trace the fearful consequences of such things.”

“In themselves, they are not serious. Mining experts can be sent to Almaden, if the situation were to get worse. Hydroponics engineers can be used in Java or in Ceylon, if there are too many at Tientsin. Twenty thousand long tons of steel won’t fill more than a few days of world demand, and the opening of the Mexican Canal two months later than the planned date is of little moment. It’s the Machines that worry me; I’ve spoken to your Director of Research about them already.”

“To Vincent Silver? – He hasn’t mentioned anything about it to me.”

“I asked him to speak to no one. Apparently, he hasn’t.”

“And what did he tell you?”

“Let me put that item in its proper place. I want to talk about the Machines first. And I want to talk about them to you, because you’re the only one in the world who understands robots well enough to help me now. – May I grow philosophical?”

“For this evening, Stephen, you may talk how you please and of what you please, provided you tell me first what you intend to prove.”

“That such small unbalances in the perfection of our system of supply and demand, as I have mentioned, may be the first step towards the final war.”

“Hmp. Proceed.”

Susan Calvin did not allow herself to relax, despite the designed comfort of the chair she sat in. Her cold, thin-lipped face and her flat, even voice were becoming accentuated with the years. And although Stephen Byerley was one man she could like and trust, she was almost seventy and the cultivated habits of a lifetime are not easily broken.

“Every period of human development, Susan,” said the Coordinator, “has had its own particular type of human conflict – its own variety of problem that, apparently, could be settled only by force. And each time, frustratingly enough, force never really settled the problem. Instead, it persisted through a series of conflicts, then vanished of itself, – what’s the expression, – ah, yes ‘not with a bang, but a whimper,’ as the economic and social environment changed. And then, new problems, and a new series of wars, – apparently endlessly cyclic.

“Consider relatively modern times. There were the series of dynastic wars in the sixteenth to eighteenth centuries, when the most important question in Europe was whether the houses of Hapsburg or Valois-Bourbon were to rule the continent. It was one of those ‘inevitable conflicts,’ since Europe could obviously not exist half one and half the other.

“Except that it did, and no war ever wiped out the one and established the other, until the rise of a new social atmosphere in France in 1789 tumbled first the Bourbons and, eventually, the Hapsburgs down the dusty chute to history’s incinerator.

“And in those same centuries there were the more barbarous religious wars, which revolved about the important question of whether Europe was to be Catholic or Protestant. Half and half she could not be. It was ‘inevitable’ that the sword decide. – Except that it didn’t. In England, a new industrialism was growing, and on the continent, a new nationalism. Half and half Europe remains to this day and no one cares much.

“In the nineteenth and twentieth centuries, there was a cycle of nationalist-imperialist wars, when the most important question in the world was which portions of Europe would control the economic resources and consuming capacity of which portions of non-Europe. All non-Europe obviously could not exist part English and part

French and part German and so on. – Until the forces of nationalism spread sufficiently, so that non-Europe ended what all the wars could not, and decided it could exist quite comfortably all non-European.

“And so we have a pattern -”

“Yes. Stephen, you make it plain,” said Susan Calvin. “These are not very profound observations.”

“No. – But then, it is the obvious which is so difficult to see most of the time. People say ‘It’s as plain as the nose on your face.’ But how much of the nose on your face can you see, unless someone holds a mirror up to you? In the twentieth century, Susan, we started a new cycle of wars – what shall I call them? Ideological wars? The emotions of religion applied to economic systems, rather than to extra-natural ones? Again the wars were ‘inevitable’ and this time there were atomic weapons, so that mankind could no longer live through its torment to the inevitable wasting away of inevitability. – And positronic robots came.

“They came in time, and, with it and alongside it, interplanetary travel. – So that it no longer seemed so important whether the world was Adam Smith or Karl Marx. Neither made very much sense under the new circumstances. Both had to adapt and they ended in almost the same place.”

“A deus ex machina, then, in a double sense,” said Dr. Calvin, dryly.

The Co-ordinator smiled gently, “I have never heard you pun before, Susan, but you are correct.

And yet there was another danger. The ending of every other problem had merely given birth to another. Our new worldwide robot economy may develop its own problems, and for that reason we have the Machines. The Earth’s economy is stable, and will remain stable, because it is based upon the decisions of calculating machines that

have the good of humanity at heart through the overwhelming force of the First Law of Robotics.”

Stephen Byerley continued, “And although the Machines are nothing but the vastest conglomeration of calculating circuits ever invented, they are still robots within the meaning of the First Law, and so our Earth-wide economy is in accord with the best interests of Man. The population of Earth knows that there will be no unemployment, no over-production or shortages. Waste and famine are words in history books. And so the question of ownership of the means of production becomes obsolescent. Whoever owned them (if such a phrase has meaning), a man, a group, a nation, or all mankind, they could be utilized only as the Machines directed. – Not because men were forced to but because it was the wisest course and men knew it.

“It puts an end to war – not only to the last cycle of wars, but to the next and to all of them.

Unless –”

A long pause, and Dr. Calvin encouraged him by repetition. “Unless –”

The fire crouched and skittered along a log, then popped up.

“Unless,” said the Co-ordinator, “the Machines don’t fulfill their function.”

“I see. And that is where those trifling maladjustments come in which you mentioned awhile ago – steel, hydroponics and so on.”

“Exactly. Those errors should not be. Dr. Silver tells me they cannot be.”

“Does he deny the facts? How unusual!”

“No, he admits the facts, of course. I do him an injustice. What he denies is that any error in the machine is responsible for the so-called (his phrase) errors in the answers. He claims that the Machines

are self-correcting and that it would violate the fundamental laws of nature for an error to exist in the circuits of relays. And so I said –”

“And you said, ‘Have your boys check them and make sure, anyway.’”

“Susan, you read my mind. It was what I said, and he said he couldn’t.”

“Too busy?”

“No, he said that no human could. He was frank about it. He told me, and I hope I understand him properly, that the Machines are a gigantic extrapolation. Thus, a team of mathematicians work several years calculating a positronic brain equipped to do certain similar acts of calculation. Using this brain they make further calculations to create a still more complicated brain, which they use again to make one still more complicated and so on. According to Silver, what we call the Machines are the result of ten such steps.”

“Ye-es, that sounds familiar. Fortunately, I’m not a mathematician. Poor Vincent. He is a young man. The Directors before him, Alfred Lanning and Peter Bogert, are dead, and they had no such problems. Nor had I. Perhaps roboticists as a whole should now die, since we can no longer understand our own creations.”

“Apparently not. The Machines are not super-brains in Sunday supplement sense, – although they are so pictured in the Sunday supplements. It is merely that in their own particular province of collecting and analyzing a nearly infinite number of data and relationships thereof, in nearly infinitesimal time, they have progressed beyond the possibility of detailed human control.

“And then I tried something else. I actually asked the Machine. In the strictest secrecy, we fed it the original data involved in the steel decision, its own answer, and the actual developments since, – the overproduction, that is, – and asked for an explanation of the discrepancy.”

“Good, and what was its answer?”

“I can quote you that word for word: ‘The matter admits of no explanation.’”

“And how did Vincent interpret that?”

“In two ways. Either we had not given the Machine enough data to allow a definite answer, which was unlikely. Dr. Silver admitted that. – Or else, it was impossible for the Machine to admit that it could give any answer to data which implied that it could harm a human being. This, naturally, is implied by the First Law. And then Dr. Silver recommended that I see you.”

Susan Calvin looked very tired, “I’m old, Stephen. When Peter Bogert died, they wanted to make me Director of Research and I refused. I wasn’t young then, either, and I did not wish the responsibility. They let young Silver have it and that satisfied me; but what good is it, if I am dragged into such messes.

“Stephen, let me state my position. My researches do indeed involve the interpretation of robot behavior in the light of the Three Laws of Robotics. Here, now, we have these incredible calculating machines. They are positronic robots and therefore obey the Laws of Robotics. But they lack personality; that is, their functions are extremely limited. Must be, since they are so specialized. Therefore, there is very little room for the interplay of the Laws, and my one method of attack is virtually useless. In short, I don’t know that I can help you, Stephen.”

The Co-ordinator laughed shortly, “Nevertheless, let me tell you the rest. Let me give you my theories, and perhaps you will then be able to tell me whether they are possible in the light of robopsychology.”

“By all means. Go ahead.”

“Well, since the Machines are giving the wrong answers, then, assuming that they cannot be in error, there is only one possibility.

They are being given the wrong data! In other words, the trouble is human, and not robotic. So I took my recent planetary inspection tour –”

“From which you have just returned to New York.”

“Yes. It was necessary, you see, since there are four Machines, one handling each of the Planetary Regions. And all four are yielding imperfect results.”

“Oh, but that follows, Stephen. If any one of the Machines is imperfect, that will automatically reflect in the result of the other three, since each of the others will assume as part of the data on which they base their own decisions, the perfection of the imperfect fourth. With a false assumption, they will yield false answers.”

“Uh-huh. So it seemed to me. Now, I have here the records of my interviews with each of the Regional Vice-Coordinators. Would you look through them with me? – Oh, and first, have you heard of the ‘Society for Humanity’?”

“Umm, yes. They are an outgrowth of the Fundamentalists who have kept U.S. Robots from ever employing positronic robots on the grounds of unfair labor competition and so on. The ‘Society for Humanity’ itself is anti-Machine, is it not?”

“Yes, yes, but – Well, you will see. Shall we begin? We’ll start with the Eastern Region.”

“As you say –”

The Eastern Region

a. Area: 7,500,000 square miles

b. Population: 1,700,000,000

c. Capital: Shanghai

Ching Hso-lin’s great-grandfather had been killed in the Japanese invasion of the old Chinese Republic, and there had been no one beside his dutiful children to mourn his loss or even to know

he was lost. Ching Hso-lin's grandfather had survived the civil war of the late forties, but there had been no one beside his dutiful children to know or care of that.

And yet Ching Hso-lin was a Regional Vice-Co-ordinator, with the economic welfare of half the people of Earth in his care.

Perhaps it was with the thought of all that in mind, that Ching had two maps as the only ornaments on the wall of his office. One was an old hand-drawn affair tracing out an acre or two of land, and marked with the now outmoded pictographs of old China. A little creek trickled aslant the faded markings and there were the delicate pictorial indications of lowly huts, in one of which Ching's grandfather had been born.

The other map was a huge one, sharply delineated, with all markings in neat Cyrillic characters.

The red boundary that marked the Eastern Region swept within its grand confines all that had once been China, India, Burma, Indo-China, and Indonesia. On it, within the old province of Szechuan, so light and gentle that none could see it, was the little mark placed there by Ching which indicated the location of his ancestral farm.

Ching stood before these maps as he spoke to Stephen Byerley in precise English, "No one knows better than you, Mr. Co-ordinator, that my job, to a large extent, is a sinecure. It carries with it a certain social standing, and I represent a convenient focal point for administration, but otherwise it is the Machine! – The Machine does all the work. What did you think, for instance, of the Tientsin Hydroponics works?"

"Tremendous!" said Byerley.

"It is but one of dozens, and not the largest. Shanghai, Calcutta, Batavia, Bangkok – They are widely spread and they are the answer to feeding the billion and three quarters of the East."

“And yet,” said Byerley, “you have an unemployment problem there at Tientsin. Can you be over-producing? It is incongruous to think of Asia as suffering from too much food.”

Ching’s dark eyes crinkled at the edges. “No. It has not come to that yet. It is true that over the last few months, several vats at Tientsin have been shut down, but it is nothing serious. The men have been released only temporarily and those who do not care to work in other fields have been shipped to Colombo in Ceylon, where a new plant is being put into operation.”

“But why should the vats be closed down?”

Ching smiled gently, “You do not know much of hydroponics, I see. Well, that is not surprising.

You are a Northerner, and there soil farming is still profitable. It is fashionable in the North to think of hydroponics, when it is thought of at all, as a device of growing turnips in a chemical solution, and so it is – in an infinitely complicated way.

“In the first place, by far the largest crop we deal with (and the percentage is growing) is yeast. We have upward of two thousand strains of yeast in production and new strains are added monthly. The basic food-chemicals of the various yeasts are nitrates and phosphates among the inorganics together with proper amounts of the trace metals needed, down to the fractional parts per million of boron and molybdenum which are required. The organic matter is mostly sugar mixtures derived from the hydrolysis of cellulose, but, in addition, there are various food factors which must be added.

“For a successful hydroponics industry – one which can feed seventeen hundred million people – we must engage in an immense reforestation program throughout the East; we must have huge wood-conversion plants to deal with our southern jungles; we must have power, and steel, and chemical synthetics above all.”

“Why the last, sir?”

“Because, Mr. Byerley, these strains of yeast have each their peculiar properties. We have developed, as I said, two thousand strains. The beefsteak you thought you ate today was yeast. The frozen fruit confection you had for dessert was iced yeast. We have filtered yeast juice with the taste, appearance, and all the food value of milk.

“It is flavor, more than anything else, you see, that makes yeast feeding popular and for the sake of flavor we have developed artificial, domesticated strains that can no longer support themselves on a basic diet of salts and sugar. One needs biotin; another needs pteroylglutamic acid; still others need seventeen different amino acids supplied them as well as all the Vitamins B, but one (and yet it is popular and we cannot, with economic sense, abandon it) —” Byerley stirred in his seat, “To what purpose do you tell me all this?”

“You asked me, sir, why men are out of work in Tientsin. I have a little more to explain. It is not only that we must have these various and varying foods for our yeast; but there remains the complicating factor of popular fads with passing time; and of the possibility of the development of new strains with the new requirements and new popularity. All this must be foreseen, and the Machine does the job —” “But not perfectly.”

“Not very imperfectly, in view of the complications I have mentioned. Well, then, a few thousand workers in Tientsin are temporarily out of a job. But, consider this, the amount of waste in this past year (waste that is, in terms of either defective supply or defective demand) amounts to not one-tenth of one percent of our total productive turnover. I consider that —”

“Yet in the first years of the Machine, the figure was nearer one-thousandth of one percent.”

“Ah, but in the decade since the Machine began its operations in real earnest, we have made use of it to increase our old pre-

Machine yeast industry twenty-fold. You expect imperfections to increase with complications, though –”

“Though?”

“There was the curious instance of Rama Vrasayana.”

“What happened to him?”

“Vrasayana was in charge of a brine-evaporation plant for the production of iodine, with which yeast can do without, but human beings not. His plant was forced into receivership.”

“Really? And through what agency?”

“Competition, believe it or not. In general, one of the chiefest functions of the Machine’s analyses is to indicate the most efficient distribution of our producing units. It is obviously faulty to have areas insufficiently serviced, so that the transportation costs account for too great a percentage of the overhead. Similarly, it is faulty to have an area too well serviced, so that factories must be run at lowered capacities, or else compete harmfully with one another. In the case of Vrasayana, another plant was established in the same city, and with a more efficient extracting system.”

“The Machine permitted it?”

“Oh, certainly. That is not surprising. The new system is becoming widespread. The surprise is that the Machine failed to warn Vrasayana to renovate or combine. – Still, no matter. Vrasayana accepted a job as engineer in the new plant, and if his responsibility and pay are now less, he is not actually suffering. The workers found employment easily; the old plant has been converted to – something or other. Something useful. We left it all to the Machine.”

“And otherwise you have no complaints.”

“None!”

The Tropic Region:

- a. Area: 22,000,000 square miles
- b. Population: 500,000,000
- c. Capital: Capital City

The map in Lincoln Ngoma's office was far from the model of neat precision of the one in Ching's Shanghai dominion. The boundaries of Ngoma's Tropic Region were stenciled in dark, wide brown and swept about a gorgeous interior labeled "jungle" and "desert" and "here be Elephants and all Manner of Strange Beasts."

It had much to sweep, for in land area the Tropic Region enclosed most of two continents: all of South America north of Argentina and all of Africa south of the Atlas. It included North America south of the Rio Grande as well, and even Arabia and Iran in Asia. It was the reverse of the Eastern Region. Where the ant hives of the Orient crowded half of humanity into 15 percent of the land mass, the Tropics stretched its 15 per cent of Humanity over nearly half of all the land in the world.

But it was growing. It was the one Region whose population increase through immigration exceeded that through births. – And for all who came it had use.

To Ngoma, Stephen Byerley seemed like one of these immigrants, a pale searcher for the creative work of carving a harsh environment into the softness necessary for man, and he felt some of that automatic contempt of the strong man born to the strong Tropics for the unfortunate pallards of the colder suns.

The Tropics had the newest capital city on Earth, and it was called simply that: "Capital City," in the sublime confidence of youth. It spread brightly over the fertile uplands of Nigeria and outside Ngoma's windows, far below, was life and color; the bright, bright sun and the quick, drenching showers. Even the squawking of

the rainbowed birds was brisk and the stars were hard pinpoints in the sharp night.

Ngoma laughed. He was a big, dark man, strong faced and handsome.

“Sure,” he said, and his English was colloquial and mouth-filling, “the Mexican Canal is overdue.”

“What the hell? It will get finished just the same, old boy.”

“It was doing well up to the last half year.”

Ngoma looked at Byerley and slowly crunched his teeth over the end of a big cigar, spitting out one end and lighting the other, “Is this an official investigation, Byerley? What’s going on?”

“Nothing. Nothing at all. It’s just my function as Coordinator to be curious.”

“Well, if it’s just that you are filling in a dull moment, the truth is that we’re always short on labor.

There’s lots going on in the Tropics. The Canal is only one of them –”

“But doesn’t your Machine predict the amount of labor available for the Canal, – allowing for all the competing projects?”

Ngoma placed one hand behind his neck and blew smoke rings at the ceiling, “It was a little off.”

“Is it often a little off?”

“Not oftener than you would expect. – We don’t expect too much of it, Byerley. We feed it data.

We take its results. We do what it says. – But it’s just a convenience, just a laborsaving device.

We could do without it, if we had to. Maybe not as well, maybe not as quickly, but we’d get there.

“We’ve got confidence out here, Byerley, and that’s the secret. Confidence! We’ve got new land that’s been waiting for us for thousands of years, while the rest of the world was being ripped apart

in the lousy fumbblings of pre-atomic time. We don't have to eat yeast like the Eastern boys, and we don't have to worry about the stale dregs of the last century like you Northerners.

"We've wiped out the tsetse fly and the Anopheles mosquito, and people find they can live in the sun and like it, now. We've thinned down the jungles and found soil; we've watered the deserts and found gardens. We've got coal and oil in untouched fields, and minerals out of count.

"Just step back. That's all we ask the rest of the world to do. – Step back, and let us work."

Byerley said, prosaically, "But the Canal, – it was on schedule six months ago. What happened?"

Ngoma spread his hands, "Labor troubles." He felt through a pile of papers skeltered about his desk and gave it up.

"Had something on the matter here," he muttered, "but never mind. There was a work shortage somewhere in Mexico once on the question of women. There weren't enough women in the neighborhood. It seemed no one had thought of feeding sexual data to the Machine."

He stopped to laugh, delightedly, then sobered, "Wait a while. I think I've got it. – Villafranca!"

"Villafranca?"

"Francisco Villafranca. – He was the engineer in charge. Now let me straighten it out. Something happened and there was a cave-in. Right. Right. That was it. Nobody died, as I remember, but it made a hell of a mess. – Quite a scandal."

"Oh?"

"There was some mistake in his calculations. – Or at least, the Machine said so. They fed through Villafranca's data, assumptions, and so on. The stuff he had started with. The answers came out differently. It seems the answers Villafranca had used didn't take

account of the effect of a heavy rainfall on the contours of the cut. – Or something like that. I’m not an engineer, you understand.

“Anyway, Villafranca put up a devil of a squawk. He claimed the Machine’s answer had been different the first time. That he had followed the Machine faithfully. Then he quit! We offered to hold him on – reasonable doubt, previous work satisfactory, and all that – in a subordinate position, of course – had to do that much – mistakes can’t go unnoticed – bad for discipline – Where was I?”

“You offered to hold him on.”

“Oh yes. He refused. – Well, take all in all, we’re two months behind. Hell, that’s nothing.”

Byerley stretched out his hand and let the fingers tap lightly on the desk, “Villafranca blamed the Machine, did he?”

“Well, he wasn’t going to blame himself, was he? Let’s face it; human nature is an old friend of ours. Besides, I remember something else now – Why the hell can’t I find documents when I want them? My filing system isn’t worth a damn – This Villafranca was a member of one of your Northern organizations. Mexico is too close to the North! that’s part of the trouble.”

“Which organization are you speaking of?”

“The Society of Humanity, they call it. He used to attend the annual conference in New York, Villafranca did. Bunch of crackpots, but harmless. – They don’t like the Machines; claim they’re destroying human initiative. So naturally Villafranca would blame the Machine. – Don’t understand that group myself. Does Capital City look as if the human race were running out of initiative?”

And Capital City stretched out in golden glory under a golden sun, – the newest and youngest creation of Homo metropolis.

The European Region

a. Area: 4,000,000 square miles

b. Population: 300,000,000

c. Capital: Geneva

The European Region was an anomaly in several ways. In area, it was far the smallest, not one-fifth the size of the Tropic Region in area, and not one-fifth the size of the Eastern Region in population.

Geographically, it was only somewhat similar to pre-Atomic Europe, since it excluded what had once been European Russia and what had once been the British Isles, while it included the Mediterranean coasts of Africa and Asia, and, in a queer jump across the Atlantic, Argentina, Chile, and Uruguay as well.

Nor was it likely to improve its relative status vis-à-vis the other regions of Earth, except for what vigor the South American provinces lent it. Of all the Regions, it alone showed a positive population decline over the past half century. It alone had not seriously expanded its productive facilities, or offered anything radically new to human culture.

“Europe,” said Madame Szegeczowska, in her soft French, “is essentially an economic appendage of the Northern Region. We know it, and it doesn’t matter.”

And as though in resigned acceptance of a lack of individuality, there was no map of Europe on the wall of the Madame Co-ordinator’s office.

“And yet,” pointed out Byerley, “you have a Machine of your own, and you are certainly under no economic pressure from across the ocean.”

“A Machine! Bah!” She shrugged her delicate shoulders, and allowed a thin smile to cross her little face as she tamped out a cigarette with long fingers. “Europe is a sleepy place. And such of our men as do not manage to immigrate to the Tropics are tired and sleepy along with it. You see for yourself that it is myself, a poor

woman, to whom falls the task of being Vice-Co-ordinator. Well, fortunately, it is not a difficult job, and not much is expected of me.

“As for the Machine – What can it say but ‘Do this and it will be best for you.’ But what is best for us? Why, to be an economic appendage of the Northern Region.

“And is it so terrible? No wars! We live in peace – and it is pleasant after seven thousand years of war. We are old, monsieur. In our borders, we have the regions where Occidental civilization was cradled. We have Egypt and Mesopotamia; Crete and Syria; Asia Minor and Greece. – But old age is not necessarily an unhappy time. It can be a fruition –”

“Perhaps you are right,” said Byerley, affably. “At least the tempo of life is not as intense as in the other Regions. It is a pleasant atmosphere.”

“Is it not? – Tea is being brought, monsieur. If you will indicate your cream and sugar preference, please. Thank you.

She sipped gently, then continued, “It is pleasant. The rest of Earth is welcome to the continuing struggle. I find a parallel here, a very interesting one. There was a time when Rome was master of the world. It had adopted the culture and civilization of Greece, a Greece which had never been united, which had ruined itself with war, and which was ending in a state of decadent squalor.

Rome united it, brought it peace and let it live a life of secure non-glory. It occupied itself with its philosophies and its art, far from the clash of growth and war. It was a sort of death, but it was restful, and it lasted with minor breaks for some four hundred years.”

“And yet,” said Byerley, “Rome fell eventually, and the opium dream was over.”

“There are no longer barbarians to overthrow civilization.”

“We can be our own barbarians. Madame Szegeczowska. – Oh, I meant to ask you. The Almaden mercury mines have fallen off

quite badly in production. Surely the ores are not declining more rapidly than anticipated?”

The little woman’s gray eyes fastened shrewdly on Byerley, “Barbarians – the fall of civilization – possible failure of the Machine. Your thought processes are very transparent, monsieur.”

“Are they?” Byerley smiled. “I see that I should have had men to deal with as hitherto. – You consider the Almaden affair to be the fault of the Machine?”

“Not at all, but I think you do. You, yourself, are a native of the Northern Region. The Central Co-ordination Office is at New York. – And I have noticed for quite a while that you Northerners lack somewhat of faith in the Machine.”

“We do?”

“There is your ‘Society for Humanity’ which is strong in the North, but naturally fails to find many recruits in tired, old Europe, which is quite willing to let feeble Humanity alone for a while. Surely, you are one of the confident North and not one of the cynical old continent.”

“This has a connection with Almaden?”

“Oh, yes, I think so. The mines are in the control of Consolidated Cinnabar, which is certainly a Northern company, with headquarters at Nikolaev. Personally, I wonder if the Board of Directors have been consulting the Machine at all. They said they had in our conference last month, and, of course, we have no evidence that they did not, but I wouldn’t take the word of a Northerner in this matter – no offense intended – under any circumstances. – Nevertheless, I think it will have a fortunate ending.”

“In what way, my dear madam?”

“You must understand that the economic irregularities of the last few months, which, although small as compared with the great storms of the past, are quite disturbing to our peace-drenched spirits, have caused considerable restiveness in the Spanish province. I understand that Consolidated Cinnabar is selling out to a group of native Spaniards. It is consoling. If we are economic vassals of the North, it is humiliating to have the fact advertised too blatantly. – And our people can be better trusted to follow the Machine.”

“Then you think there will be no more trouble?”

“I am sure there will not be – In Almaden, at least.”

The Northern Region

a. Area: 18,000,000 square miles

b. Population: 800,000,000

c. Capital: Ottawa

The Northern Region, in more ways than one, was at the top. This was exemplified quite well by the map in the Ottawa office of Vice-Co-ordinator Hiram Mackenzie, in which the North Pole was centered. Except for the enclave of Europe with its Scandinavian and Icelandic regions, all the Arctic area was within the Northern Region.

Roughly, it could be divided into two major areas. To the left on the map was all of North America above the Rio Grande. To the right was included all of what had once been the Soviet Union.

Together these areas represented the centered power of the planet in the first years of the Atomic Age. Between the two was Great Britain, a tongue of the Region licking at Europe. Up at the top of the map, distorted into odd, huge shapes, were Australia and New Zealand, also member provinces of the Region.

Not all the changes of the past decades had yet altered the fact that the North was the economic ruler of the planet.

There was almost an ostentatious symbolism thereof in the fact that of the official Regional maps Byerley had seen, Mackenzie's alone showed all the Earth, as though the North feared no competition and needed no favoritism to point up its pre-eminence.

"Impossible," said Mackenzie, dourly, over the whiskey. "Mr. Byerley, you have had no training as a robot technician, I believe."

"No, I have not."

"Hmp. Well, it is, in my opinion, a sad thing that Ching, Ngoma and Szegeczowska haven't either.

There is too prevalent an opinion among the peoples of Earth that a Co-ordinator need only be a capable organizer, a broad generalizer, and an amiable person. These days he should know his robotics as well, no offense intended."

"None taken. I agree with you."

"I take it, for instance, from what you have said already, that you worry about the recent trifling dislocation in world economy. I don't know what you suspect, but it has happened in the past that people – who should have known better – wondered what would happen if false data were fed into the Machine."

"And what would happen, Mr. Mackenzie?"

"Well," the Scotsman shifted his weight and sighed, "all collected data goes through a complicated screening system which involves both human and mechanical checking, so that the problem is not likely to arise. – But let us ignore that. Humans are fallible, also corruptible, and ordinary mechanical devices are liable to mechanical failure.

"The real point of the matter is that what we call a 'wrong datum' is one which is inconsistent with all other known data. It is our only criterion of right and wrong. It is the Machine's as well. Order it for instance, to direct agricultural activity on the basis of an

average July temperature in Iowa of 57 degrees Fahrenheit. It won't accept that. It will not give an answer. – Not that it has any prejudice against that particular temperature, or that an answer is impossible; but because, in the light of all the other data fed it over a period of years, it knows that the probability of an average July temperature of 57 is virtually nil. It rejects that datum.

“The only way a ‘wrong datum’ can be forced on the Machine is to include it as part of a self-consistent whole, all of which is subtly wrong in a manner either too delicate for the Machine to detect or outside the Machine’s experience. The former is beyond human capacity, and the latter is almost so, and is becoming more nearly so as the Machine’s experience increases by the second.”

Stephen Byerley placed two fingers to the bridge of his nose, “Then the Machine cannot be tampered with – And how do you account for recent errors, then?”

“My dear Byerley, I see that you instinctively follow that great error – that the Machine knows all.

Let me cite you a case from my personal experience. The cotton industry engages experienced buyers who purchase cotton. Their procedure is to pull a tuft of cotton out of a random bale of a lot.

They will look at that tuft and feel it, tease it out, listen to the crackling perhaps as they do so, touch it with their tongue, and through this procedure they will determine the class of cotton the bales represent. There are about a dozen such classes. As a result of their decisions, purchases are made at certain prices; blends are made in certain proportions. – Now these buyers cannot yet be replaced by the Machine.”

“Why not? Surely the data involved is not too complicated for it?”

“Probably not. But what data is this you refer to? No textile chemist knows exactly what it is that the buyer tests when he feels a tuft of cotton. Presumably there’s the average length of the threads, their feel, the extent and nature of their slickness, the way they hang together, and so on. – Several dozen items, subconsciously weighed, out of years of experience. But the quantitative nature of these tests is not known; maybe even the very nature of some of them is not known. So we have nothing to feed the Machine. Nor can the buyers explain their own judgment. They can only say,

“Well, look at it. Can’t you tell it’s class-such-and-such?”

“I see.”

“There are innumerable cases like that. The Machine is only a tool after all, which can help humanity progress faster by taking some of the burdens of calculations and interpretations off its back. The task of the human brain remains what it has always been, that of discovering new data to be analyzed, and of devising new concepts to be tested. A pity the Society for Humanity won’t understand that.”

“They are against the Machine?”

“They would be against mathematics or against the art of writing if they had lived at the appropriate time. These reactionaries of the Society claim the Machine robs man of his soul. I notice that capable men are still at a premium in our society; we still need the man who is intelligent enough to think of the proper questions to ask. Perhaps if we could find enough of such, these dislocations you worry about, Coordinator, wouldn’t occur.”

Earth (Including the uninhabited continent, Antarctica)

a. Area: 54,000,000 square miles (land surface)

b. Population: 3,300,000,000

c. Capital: New York

The fire behind the quartz was weary now, and sputtered its reluctant way to death.

The Co-ordinator was somber, his mood matching the sinking flame.

“They all minimize the state of affairs.” His voice was low. “Is it not easy to imagine that they all laugh at me? And yet Vincent Silver said the Machines cannot be out of order, and I must believe him. Hiram Mackenzie says they cannot be fed false data, and I must believe him. But the Machines are going wrong, somehow, and I must believe that, too; and so there is still an alternative left.”

He glanced sidewise at Susan Calvin, who, with closed eyes, for a moment seemed asleep.

“What is that?” she asked, prompt to her cue, nevertheless.

“Why, that correct data is indeed given, and correct answers are indeed received, but that they are then ignored. There is no way the Machine can enforce obedience to its dictates.”

“Madame Szegeczowska hinted as much, with reference to Northerners in general, it seems to me.”

“So she did.”

“And what purpose is served by disobeying the Machine? Let’s consider motivations.”

“It’s obvious to me, and should be to you. It is a matter of rocking the boat, deliberately. There can be no serious conflicts on Earth, in which one group or another can seize more power than it has for what it thinks is its own good despite the harm to Mankind as a whole, while the Machines rule. If popular faith in the Machines can be destroyed to the point where they are abandoned, it will be the law of the jungle again. – And not one of the four Regions can be freed of the suspicion of wanting just that.

“The East has half of humanity within its borders, and the Tropics more than half of Earth’s resources. Each can feel itself the

natural rulers of all Earth, and each has a history of humiliation by the North, for which it can be human enough to wish a senseless revenge. Europe has a tradition of greatness, on the other hand. It once did rule the Earth, and there is nothing so eternally adhesive as the memory of power.

“Yet, in another way, it’s hard to believe. Both the East and the Tropics are in a state of enormous expansion within their own borders. Both are climbing incredibly. They cannot have the spare energy for military adventures. And Europe can have nothing but its dreams. It is a cipher, militarily.”

“So, Stephen,” said Susan, “you leave the North.”

“Yes,” said Byerley, energetically, “I do. The North is now the strongest, and has been for nearly a century, or its component parts have been. But it is losing relatively, now. The Tropic Regions may take their place in the forefront of civilization for the first time since the Pharaohs, and there are Northerners who fear that.

“The ‘Society for Humanity’ is a Northern organization, primarily, you know, and they make no secret of not wanting the Machines. – Susan, they are few in numbers, but it is an association of powerful men. Heads of factories; directors of industries and agricultural combines who hate to be what they call ‘the Machine’s office-boy’ belong to it. Men with ambition belong to it. Men who feel themselves strong enough to decide for themselves what is best for themselves, and not just to be told what is best for others.”

“In short, just those men who, by together refusing to accept the decisions of the Machine, can, in a short time, turn the world topsy-turvy; just those belong to the Society.

“Susan, it hangs together. Five of the Directors of World Steel are members, and World Steel suffers from overproduction. Consolidated Cinnabar, which mined mercury at Almaden, was a Northern concern. Its books are still being investigated, but one, at

least, of the men concerned was a member. Francisco Villafranca, who, single-handed, delayed the Mexican Canal for two months, was a member, we know already – and so was Rama Vrasayana, I was not at all surprised to find out.”

Susan said, quietly, “These men, I might point out, have all done badly –”

“But naturally,” interjected Byerley. “To disobey the Machine’s analyses is to follow a non-optimal path. Results are poorer than they might be. It’s the price they pay. They will have it rough now but in the confusion that will eventually follow –”

“Just what do you plan doing, Stephen?”

“There is obviously no time to lose. I am going to have the Society outlawed, every member removed from any responsible post. And all executive and technical positions, henceforward, can be filled only by applicants signing a non-Society oath. It will mean a certain surrender of basic civil liberties, but I am sure the Congress-”

“It won’t work!”

“What! – Why not?”

“I will make a prediction. If you try any such thing, you will find yourself hampered at every turn.

You will find it impossible to carry out. You will find your every move in that direction will result in trouble.”

Byerley was taken aback, “Why do you say that? I was rather hoping for your approval in this matter.”

“You can’t have it as long as your actions are based on a false premise. You admit the Machine can’t be wrong, and can’t be fed wrong data. I will now show you that it cannot be disobeyed, either, as you think is being done by the Society.”

“That I don’t see at all.”

“Then listen. Every action by any executive which does not follow the exact directions of the Machine he is working with

becomes part of the data for the next problem. The Machine, therefore, knows that the executive has a certain tendency to disobey. He can incorporate that tendency into that data, – even quantitatively, that is, judging exactly how much and in what direction disobedience would occur. Its next answers would be just sufficiently biased so that after the executive concerned disobeyed, he would have automatically corrected those answers to optimal directions. The Machine knows, Stephen!”

“You can’t be sure of all this. You are guessing.”

“It is a guess based on a lifetime’s experience with robots. You had better rely on such a guess, Stephen.”

“But then what is left? The Machines themselves are correct and the premises they work on are correct. That we have agreed upon. Now you say that it cannot be disobeyed. Then what is wrong?”

“You have answered yourself. Nothing is wrong! Think about the Machines for a while, Stephen. They are robots, and they follow the First Law. But the Machines work not for any single human being, but for all humanity, so that the First Law becomes: ‘No Machine may harm humanity; or, through inaction, allow humanity to come to harm.’

“Very well, then, Stephen, what harms humanity? Economic dislocations most of all, from whatever cause. Wouldn’t you say so?”

“I would.”

“And what is most likely in the future to cause economic dislocations? Answer that, Stephen.”

“I should say,” replied Byerley, unwillingly, “the destruction of the Machines.”

“And so should I say, and so should the Machines say. Their first care, therefore, is to preserve themselves, for us. And so they are quietly taking care of the only elements left that threaten them.

It is not the ‘Society for Humanity’ which is shaking the boat so that the Machines may be destroyed. You have been looking at the reverse of the picture. Say rather that the Machine is shaking the boat very slightly – just enough to shake loose those few which cling to the side for purposes the Machines consider harmful to Humanity.

“So Vrasayana loses his factory and gets another job where he can do no harm – he is not badly hurt, he is not rendered incapable of earning a living, for the Machine cannot harm a human being more than minimally, and that only to save a greater number. Consolidated Cinnabar loses control at Almaden. Villafranca is no longer a civil engineer in charge of an important project. And the directors of World Steel are losing their grip on the industry – or will.”

“But you don’t really know all this,” insisted Byerley, distractedly. “How can we possibly take a chance on your being right?”

“You must. Do you remember the Machine’s own statement when you presented the problem to him? It was: ‘The matter admits of no explanation.’ The Machine did not say there was no explanation, or that it could determine no explanation. It simply was not going to admit any explanation. In other words, it would be harmful to humanity to have the explanation known, and that’s why we can only guess – and keep on guessing.”

“But how can the explanation do us harm? Assume that you are right, Susan.”

“Why, Stephen, if I am right, it means that the Machine is conducting our future for us not only simply in direct answer to our direct questions, but in general answer to the world situation and to human psychology as a whole. And to know that may make us unhappy and may hurt our pride.

The Machine cannot, must not, make us unhappy.

“Stephen, how do we know what the ultimate good of Humanity will entail? We haven’t at our disposal the infinite factors that the Machine has at its! Perhaps, to give you a not unfamiliar example, our entire technical civilization has created more unhappiness and misery than it has removed. Perhaps an agrarian or pastoral civilization, with less culture and less people would be better. If so, the Machines must move in that direction, preferably without telling us, since in our ignorant prejudices we only know that what we are used to, is good – and we would then fight change. Or perhaps a complete urbanization, or a completely caste-ridden society, or complete anarchy, is the answer. We don’t know. Only the Machines know, and they are going there and taking us with them.”

“But you are telling me, Susan, that the ‘Society for Humanity’ is right; and that Mankind has lost its own say in its future.”

“It never had any, really. It was always at the mercy of economic and sociological forces it did not understand – at the whims of climate, and the fortunes of war. Now the Machines understand them; and no one can stop them, since the Machines will deal with them as they are dealing with the Society, – having, as they do, the greatest of weapons at their disposal, the absolute control of our economy.”

“How horrible!”

“Perhaps how wonderful! Think, that for all time, all conflicts are finally evitable. Only the Machines, from now on, are inevitable!”

And the fire behind the quartz went out and only a curl of smoke was left to indicate its place.

“And that is all,” said Dr. Calvin, rising. “I saw it from the beginning, when the poor robots couldn’t speak, to the end, when they stand between mankind and destruction. I will see no more.

My life is over. You will see what comes next.”

I never saw Susan Calvin again. She died last month at the age of eighty-two.

QUESTIONS ON COMPREHENSION

1. What medieval curiosity did the Co-ordinator have in his private study?

2. What was Stephen Byerley’s purpose of visiting Dr. Susan Calvin of U.S. Robots & Mechanical Men Corporation?

3. In what connection is the phrase “it’s as plain as the nose on your face” used in the text?

4. What do we learn about Ching Hso-lin in the story?

5. What facts prove that the new system is becoming widespread?

6. Why did the human race run out of initiative?

RAY D. BRADBURY

Ray Douglas Bradbury (1920 – 2012) was an American literary, fantasy, horror, science fiction, and mystery writer best known for The Martian Chronicles, a 1950 book which has been described both as a short story collection and a novel, and his 1953 dystopian novel Fahrenheit 451.

Ray Bradbury was born in Waukegan, Illinois, to a Swedish immigrant mother and a father who was a power and telephone lineman. Bradbury was a reader and writer throughout his youth, spending much time in the Carnegie Library in Waukegan. His novels Dandelion Wine, Something Wicked This Way Comes, and Farewell Summer depict the town of Waukegan as “Green Town” and are semi-autobiographical. Ray showed promise as a writer at

the early age of eleven when he began writing short stories on butcher paper. As a child, he was fascinated by magic and fantasy and spent many an afternoon dreaming that he would grow up to be a magician himself. In his youth, his family moved from Illinois to Arizona, and then on to Los Angeles, where he spent most of his earlier years. Bradbury graduated from Los Angeles High School in 1938 but chose not to attend college. Instead, he sold newspapers at the corner of South Norton Avenue and Olympic Boulevard. He continued to educate himself at the local library, and having been influenced by science fiction heroes like Flash Gordon and Buck Rogers, he began to publish science fiction stories in fanzines in 1938. He became a full-time writer by the end of 1942. His first book, Dark Carnival, a collection of short works, was published in 1947 by Arkham House.

In 1950, Bradbury turned his attention solely to science fiction, although most of his writing had an element of social commentary in it. The Martian Chronicles reflected the prevailing anxieties of post-war America and the fascination that mankind had developed for discovering life on other planets. The book was very popular and gained Bradbury the reputation as a leading writer of science fiction in America.

Although he is often described as a science fiction writer, Bradbury does not box himself into a particular narrative categorization:

First of all, I don't write science fiction. I've only done one science fiction book and that's Fahrenheit 451, based on reality. Science fiction is a depiction of the real. Fantasy is a depiction of the unreal. So Martian Chronicles is not science fiction, it's fantasy. It couldn't happen, you see?

That's the reason it's going to be around a long time – because it's a Greek myth, and myths have staying power.

Besides his fiction work, Bradbury has written many short essays on the arts and culture, attracting the attention of critics in this field. Bradbury was a consultant for the American Pavilion at the 1964 New York World's Fair and the original exhibit housed in Epcot's Spaceship Earth geosphere at Walt Disney World.

Many of his books have been made into major motion pictures and several have won him awards, including the O'Henry Memorial Award, the Benjamin Franklin award, the Aviation Space Writers Association Award, and the Grand Master Award from the Science Fiction Writers of America. He was also awarded the World Fantasy Award for Lifetime Achievement.

Fahrenheit 451

“Who is it?”

“Who would it be?” said Montag, leaning back against the closed door in the dark.

His wife said, at last, “Well, put on the light.”

“I don't want the light.”

“Come to bed.”

He heard her roll impatiently; the bedsprings squealed.

“Are you drunk?” she said.

So it was the hand that started it all. He felt one hand and then the other work his coat free and let it slump to the floor. He held his pants out into an abyss and let them fall into darkness. His hands had been infected, and soon it would be his arms. He could feel the poison working up his wrists and into his elbows and his shoulders, and then the jump-over from shoulder-blade to shoulder-blade like a spark leaping a gap. His hands were ravenous. And his eyes were beginning to feel hunger, as if they must look at something, anything, everything.

His wife said, “What are you doing?”

He balanced in space with the book in his sweating cold fingers.

A minute later she said, “Well, just don’t stand there in the middle of the floor.”

He made a small sound.

“What?” she asked.

He made more soft sounds. He stumbled towards the bed and shoved the book clumsily under the cold pillow. He fell into bed and his wife cried out, startled. He lay far across the room from her, on a winter island separated by an empty sea. She talked to him for what seemed a long while and she talked about this and she talked about that and it was only words, like the words he had heard once in a nursery at a friend’s house, a two-year-old child building word patterns, talking jargon, making pretty sounds in the air. But Montag said nothing and after a long while when he only made the small sounds, he felt her move in the room and come to his bed and stand over him and put her hand down to feel his cheek. He knew that when she pulled her hand away from his face it was wet.

Late in the night he looked over at Mildred. She was awake. There was a tiny dance of melody in the air, her Seashell was tamped in her ear again and she was listening to far people in far places, her eyes wide and staring at the fathoms of blackness above her in the ceiling.

Wasn’t there an old joke about the wife who talked so much on the telephone that her desperate husband ran out to the nearest store and telephoned her to ask what was for dinner? Well, then, why didn’t he buy himself an audio-Seashell broadcasting station and talk to his wife late at night, murmur, whisper, shout, scream, yell? But what would he whisper, what would he yell? What could he say?

And suddenly she was so strange he couldn’t believe he knew her at all. He was in someone else’s house, like those other jokes

people told of the gentleman, drunk, coming home late at night, unlocking the wrong door, entering a wrong room, and bedding with a stranger and getting up early and going to work and neither of them the wiser.

“Millie...?” he whispered.

“What?”

“I didn’t mean to startle you. What I want to know is...”

“Well?”

“When did we meet. And where?”

“When did we meet for what?” she asked.

“I mean – originally.”

He knew she must be frowning in the dark.

He clarified it. “The first time we ever met, where was it, and when?”

“Why, it was at –”

She stopped.

“I don’t know,” she said.

He was cold. “Can’t you remember?”

“It’s been so long.”

“Only ten years, that’s all, only ten!”

“Don’t get excited, I’m trying to think.” She laughed an odd little laugh that went up and up. “Funny, how funny, not to remember where or when you met your husband or wife.”

He lay massaging his eyes, his brow, and the back of his neck, slowly. He held both hands over his eyes and applied a steady pressure there as if to crush memory into place. It was suddenly more important than any other thing in a life-time that he knew where he had met Mildred.

“It doesn’t matter.” She was up in the bathroom now, and he heard the water running, and the swallowing sound she made.

“No, I guess not,” he said.

He tried to count how many times she swallowed and he thought of the visit from the two zinc-oxide-faced men with the cigarettes in their straight-lined mouths and the electronic-eyed snake winding down into the layer upon layer of night and stone and stagnant spring water, and he wanted to call out to her, how many have you taken tonight! the capsules! how many will you take later and not know? and so on, every hour! or maybe not tonight, tomorrow night! And me not sleeping, tonight or tomorrow night or any night for a long while; now that this has started. And he thought of her lying on the bed with the two technicians standing straight over her, not bent with concern, but only standing straight, arms folded. And he remembered thinking then that if she died, he was certain he wouldn't cry. For it would be the dying of an unknown, a street face, a newspaper image, and it was suddenly so very wrong that he had begun to cry, not at death but at the thought of not crying at death, a silly empty man near a silly empty woman, while the hungry snake made her still more empty.

How do you get so empty? he wondered. Who takes it out of you? And that awful flower the other day, the dandelion! It had summed up everything, hadn't it? "What a shame! You're not in love with anyone!" And why not?

Well, wasn't there a wall between him and Mildred, when you came down to it? Literally not just one wall but, so far, three! And expensive, too! And the uncles, the aunts, the cousins, the nieces, the nephews, that lived in those walls, the gibbering pack of tree-apes that said nothing, nothing, nothing and said it loud, loud, loud. He had taken to calling them relatives from the very first. "How's Uncle Louis today?" "Who?" "And Aunt Maude?" The most significant memory he had of Mildred, really, was of a little girl in a forest without trees (how odd!) or rather a little girl lost on a plateau where there used to be trees (you could feel the memory of their shapes all

about) sitting in the centre of the “living-room.” The living-room; what a good job of labelling that was now. No matter when he came in, the walls were always talking to Mildred.

“Something must be done!”

“Yes, something must be done!”

“Well, let’s not stand and talk!”

“Let’s do it!”

“I’m so mad I could spit!”

What was it all about? Mildred couldn’t say. Who was mad at whom? Mildred didn’t quite know. What were they going to do? Well, said Mildred, wait around and see.

He had waited around to see.

A great thunderstorm of sound gushed from the walls. Music bombarded him at such an immense volume that his bones were almost shaken from their tendons; he felt his jaw vibrate, his eyes wobble in his head. He was a victim of concussion. When it was all over he felt like a man who had been thrown from a cliff, whirled in a centrifuge and spat out over a waterfall that fell and fell into emptiness and emptiness and never-quite-touched-bottom-never-never-quite-no not quite-touched-bottom... and you fell so fast you didn’t touch the sides either... never... quite... touched... anything.

The thunder faded. The music died.

“There,” said Mildred.

And it was indeed remarkable. Something had happened. Even though the people in the walls of the room had barely moved, and nothing had really been settled, you had the impression that someone had turned on a washing-machine or sucked you up in a gigantic vacuum. You drowned in music and pure cacophony. He came out of the room sweating and on the point of collapse. Behind him, Mildred sat in her chair and the voices went on again:

“Well, everything will be all right now,” said an “aunt.”

“Oh, don’t be too sure,” said a “cousin.”

“Now, don’t get angry!”

“Who’s angry?”

“You are!”

“You’re mad!”

“Why should I be mad!”

“Because!”

“That’s all very well,” cried Montag, “but what are they mad about? Who are these people? Who’s that man and who’s that woman? Are they husband and wife, are they divorced, engaged, what? Good God, nothing’s connected up.”

“They –” said Mildred. “Well, they – they had this fight, you see. They certainly fight a lot. You should listen. I think they’re married. Yes, they’re married. Why?”

And if it was not the three walls soon to be four walls and the dream complete, then it was the open car and Mildred driving a hundred miles an hour across town, he shouting at her and she shouting back and both trying to hear what was said, but hearing only the scream of the car. “At least keep it down to the minimum!” he yelled: “What?” she cried. “Keep it down to fifty-five, the minimum!” he shouted. “The what?” she shrieked. “Speed!” he shouted. And she pushed it up to one hundred and five miles an hour and tore the breath from his mouth.

When they stepped out of the car, she had the Seashells stuffed in her ears.

Silence. Only the wind blowing softly.

“Mildred.” He stirred in bed.

He reached over and pulled one of the tiny musical insects out of her ear. “Mildred. Mildred?”

“Yes.” Her voice was faint.

He felt he was one of the creatures electronically inserted between the slots of the phono-colour walls, speaking, but the speech not piercing the crystal barrier. He could only pantomime, hoping she would turn his way and see him. They could not touch through the glass.

“Mildred, do you know that girl I was telling you about?”

“What girl?” She was almost asleep.

“The girl next door.”

“What girl next door?”

“You know, the high-school girl. Clarisse, her name is.”

“Oh, yes,” said his wife.

“I haven’t seen her for a few days – four days to be exact. Have you seen her?”

“No.”

“I’ve meant to talk to you about her. Strange.”

“Oh, I know the one you mean.”

“I thought you would.”

“Her,” said Mildred in the dark room.

“What about her?” asked Montag.

“I meant to tell you. Forgot. Forgot.”

“Tell me now. What is it?”

“I think she’s gone.”

“Gone?”

“Whole family moved out somewhere. But she’s gone for good. I think she’s dead.”

“We couldn’t be talking about the same girl.”

“No. The same girl. McClellan. McClellan, run over by a car. Four days ago. I’m not sure. But I think she’s dead. The family moved out anyway. I don’t know. But I think she’s dead.”

“You’re not sure of it!”

“No, not sure. Pretty sure.”

“Why didn’t you tell me sooner?”

“Forgot.”

“Four days ago!”

“I forgot all about it.”

“Four days ago,” he said, quietly, lying there.

They lay there in the dark room not moving, either of them.

“Good night,” she said.

He heard a faint rustle. Her hands moved. The electric thimble moved like a praying mantis on the pillow, touched by her hand. Now it was in her ear again, humming.

He listened and his wife was singing under her breath.

Outside the house, a shadow moved, an autumn wind rose up and faded away. But there was something else in the silence that he heard. It was like a breath exhaled upon the window. It was like a faint drift of greenish luminescent smoke, the motion of a single huge October leaf blowing across the lawn and away.

The Hound, he thought. It’s out there tonight. It’s out there now. If I opened the window...

He did not open the window.

He had chills and fever in the morning.

“You can’t be sick,” said Mildred.

He closed his eyes over the hotness. “Yes.”

“But you were all right last night.”

“No, I wasn’t all right.” He heard the “relatives” shouting in the parlour.

Mildred stood over his bed, curiously. He felt her there, he saw her without opening his eyes, her hair burnt by chemicals to a brittle straw, her eyes with a kind of cataract unseen but suspect far behind the pupils, the reddened pouting lips, the body as thin as a praying mantis from dieting, and her flesh like white bacon. He could remember her no other way.

“Will you bring me aspirin and water?”

“You’ve got to get up,” she said. “It’s noon. You’ve slept five hours later than usual.”

“Will you turn the parlour off?” he asked.

“That’s my family.”

“Will you turn it off for a sick man?”

“I’ll turn it down.”

She went out of the room and did nothing to the parlour and came back. “Is that better?”

“Thanks.”

“That’s my favourite programme,” she said.

“What about the aspirin?”

“You’ve never been sick before.” She went away again.

“Well, I’m sick now. I’m not going to work tonight. Call Beatty for me.”

“You acted funny last night.” She returned, humming.

“Where’s the aspirin?” He glanced at the water-glass she handed him.

“Oh.” She walked to the bathroom again. “Did something happen?”

“A fire, is all.”

“I had a nice evening,” she said, in the bathroom.

“What doing?”

“The parlour.”

“What was on?”

“Programmes.”

“What programmes?”

“Some of the best ever.”

“Who?”

“Oh, you know, the bunch.”

“Yes, the bunch, the bunch, the bunch.” He pressed at the pain in his eyes and suddenly the odour of kerosene made him vomit.

Mildred came in, humming. She was surprised. “Why’d you do that?”

He looked with dismay at the floor. “We burned an old woman with her books.”

“It’s a good thing the rug’s washable.” She fetched a mop and worked on it. “I went to Helen’s last night.”

“Couldn’t you get the shows in your own parlour?”

“Sure, but it’s nice visiting.”

She went out into the parlour. He heard her singing.

“Mildred?” he called.

She returned, singing, snapping her fingers softly.

“Aren’t you going to ask me about last night?” he said.

“What about it?”

“We burned a thousand books. We burned a woman.”

“Well?”

The parlour was exploding with sound.

“We burned copies of Dante and Swift and Marcus Aurelius.”

“Wasn’t he a European?”

“Something like that.”

“Wasn’t he a radical?”

“I never read him.”

“He was a radical.” Mildred fiddled with the telephone. “You don’t expect me to call Captain Beatty, do you?”

“You must!”

“Don’t shout!”

“I wasn’t shouting.” He was up in bed, suddenly, enraged and flushed, shaking. The parlour roared in the hot air. “I can’t call him. I can’t tell him I’m sick.”

“Why?”

Because you're afraid, he thought. A child feigning illness, afraid to call because after a moment's discussion, the conversation would run so: "Yes, Captain, I feel better already. I'll be in at ten o'clock tonight."

"You're not sick," said Mildred.

Montag fell back in bed. He reached under his pillow. The hidden book was still there.

"Mildred, how would it be if, well, maybe, I quit my job awhile?"

"You want to give up everything? After all these years of working, because, one night, some woman and her books —"

"You should have seen her, Millie!"

"She's nothing to me; she shouldn't have had books. It was her responsibility, she should have thought of that. I hate her. She's got you going and next thing you know we'll be out, no house, no job, nothing."

"You weren't there, you didn't see," he said. "There must be something in books, things we can't imagine, to make a woman stay in a burning house; there must be something there. You don't stay for nothing."

"She was simple-minded."

"She was as rational as you and I, more so perhaps, and we burned her."

"That's water under the bridge."

"No, not water: fire. You ever seen a burned house? It smoulders for days. Well, this fire'll last me the rest of my life. God! I've been trying to put it out, in my mind, all night. I'm crazy with trying."

"You should have thought of that before becoming a fireman."

"Thought!" he said. "Was I given a choice? My grandfather and father were firemen. In my sleep, I ran after them."

The parlour was playing a dance tune.

“This is the day you go on the early shift,” said Mildred. “You should have gone two hours ago. I just noticed.”

“It’s not just the woman that died,” said Montag. “Last night I thought about all the kerosene I’ve used in the past ten years. And I thought about books. And for the first time I realized that a man was behind each one of the books. A man had to think them up. A man had to take a long time to put them down on paper. And I’d never even thought that thought before.” He got out of bed.

“It took some man a lifetime maybe to put some of his thoughts down, looking around at the world and life, and then I came along in two minutes and boom! It’s all over.”

“Let me alone,” said Mildred. “I didn’t do anything.”

“Let you alone! That’s all very well, but how can I leave myself alone? We need not to be let alone. We need to be really bothered once in a while. How long is it since you were really bothered? About something important, about something real?”

And then he shut up, for he remembered last week and the two white stones staring up at the ceiling and the pump-snake with the probing eye and the two soap-faced men with the cigarettes moving in their mouths when they talked. But that was another Mildred, that was a Mildred so deep inside this one, and so bothered, really bothered, that the two women had never met. He turned away.

Mildred said, “Well, now you’ve done it. Out front of the house. Look who’s here.”

“I don’t care.”

“There’s a Phoenix car just driven up and a man in a black shirt with an orange snake stitched on his arm coming up the front walk.”

“Captain Beauty?” he said.

“Captain Beatty.”

Montag did not move, but stood looking into the cold whiteness of the wall immediately before him.

“Go let him in, will you? Tell him I’m sick.”

“Tell him yourself!” She ran a few steps this way, a few steps that, and stopped, eyes wide, when the front door speaker called her name, softly, softly, Mrs. Montag, Mrs. Montag, someone here, someone here, Mrs. Montag, Mrs. Montag, someone’s here. Fading.

Montag made sure the book was well hidden behind the pillow, climbed slowly back into bed, arranged the covers over his knees and across his chest, half-sitting, and after a while Mildred moved and went out of the room and Captain Beatty strolled in, his hands in his pockets.

“Shut the ‘relatives’ up,” said Beatty, looking around at everything except Montag and his wife.

This time, Mildred ran. The yammering voices stopped yelling in the parlour.

Captain Beatty sat down in the most comfortable chair with a peaceful look on his ruddy face. He took time to prepare and light his brass pipe and puff out a great smoke cloud. “Just thought I’d come by and see how the sick man is.”

“How’d you guess?”

Beatty smiled his smile which showed the candy pinkness of his gums and the tiny candy whiteness of his teeth. “I’ve seen it all. You were going to call for a night off.”

Montag sat in bed.

“Well,” said Beatty, “take the night off!” He examined his eternal matchbox, the lid of which said GUARANTEED: ONE MILLION LIGHTS IN THIS IGNITER , and began to strike the chemical match abstractedly, blow out, strike, blow out, strike, speak a few words, blow out. He looked at the flame. He blew, he looked at the smoke. “When will you be well?”

“Tomorrow. The next day maybe. First of the week.”

Beatty puffed his pipe. “Every fireman, sooner or later, hits this. They only need understanding, to know how the wheels run. Need to know the history of our profession. They don’t feed it to rookies like they used to. Damn shame.” Puff. “Only fire chiefs remember it now.” Puff. “I’ll let you in on it.”

Mildred fidgeted.

Beatty took a full minute to settle himself in and think back for what he wanted to say.

“When did it all start, you ask, this job of ours, how did it come about, where, when? Well, I’d say it really got started around about a thing called the Civil War. Even though our rule – book claims it was founded earlier. The fact is we didn’t get along well until photography came into its own. Then – motion pictures in the early twentieth century. Radio. Television. Things began to have mass.”

Montag sat in bed, not moving.

“And because they had mass, they became simpler,” said Beatty. “Once, books appealed to a few people, here, there, everywhere. They could afford to be different. The world was roomy. But then the world got full of eyes and elbows and mouths. Double, triple, quadruple population. Films and radios, magazines, books levelled down to a sort of paste pudding norm, do you follow me?”

“I think so.”

Beatty peered at the smoke pattern he had put out on the air. “Picture it. Nineteenth-century man with his horses, dogs, carts, slow motion. Then, in the twentieth century, speed up your camera. Books cut shorter. Condensations. Digests. Tabloids. Everything boils down to the gag, the snap ending.”

“Snap ending.” Mildred nodded.

“Classics cut to fit fifteen-minute radio shows, then cut again to fill a two-minute book column, winding up at last as a ten- or

twelve-line dictionary resume. I exaggerate, of course. The dictionaries were for reference. But many were those whose sole knowledge of Hamlet (you know the title certainly, Montag; it is probably only a faint rumour of a title to you, Mrs. Montag) whose sole knowledge, as I say, of Hamlet was a one-page digest in a book that claimed: 'now at least you can read all the classics; keep up with your neighbours.' Do you see? Out of the nursery into the college and back to the nursery; there's your intellectual pattern for the past five centuries or more."

Mildred arose and began to move around the room, picking things up and putting them down. Beatty ignored her and continued.

"Speed up the film, Montag, quick. Click? Pic? Look, Eye, Now, Flick, Here, There, Swift, Pace, Up, Down, In, Out, Why, How, Who, What, Where, Eh? Uh! Bang! Smack! Wallop, Bing, Bong, Boom! Digest-digests, digest-digest-digests. Politics? One column, two sentences, a headline! Then, in mid-air, all vanishes! Whirl man's mind around about so fast under the pumping hands of publishers, exploiters, broadcasters, that the centrifuge flings off all unnecessary, time-wasting thought!"

Mildred smoothed the bedclothes. Montag felt his heart jump and jump again as she patted his pillow. Right now she was pulling at his shoulder to try to get him to move so she could take the pillow out and fix it nicely and put it back. And perhaps cry out and stare or simply reach down her hand and say, "What's this?" and hold up the hidden book with touching innocence.

"School is shortened, discipline relaxed, philosophies, histories, languages dropped, English and spelling gradually neglected, finally almost completely ignored. Life is immediate, the job counts, pleasure lies all about after work. Why learn anything save pressing buttons, pulling switches, fitting nuts and bolts?"

"Let me fix your pillow," said Mildred.

“No!” whispered Montag.

“The zipper displaces the button and a man lacks just that much time to think while dressing at dawn, a philosophical hour, and thus a melancholy hour.”

Mildred said, “Here.”

“Get away,” said Montag.

“Life becomes one big pratfall, Montag; everything bang, boff, and wow!”

“Wow,” said Mildred, yanking at the pillow.

“For God’s sake, let me be!” cried Montag passionately.

Beatty opened his eyes wide.

Mildred’s hand had frozen behind the pillow. Her fingers were tracing the book’s outline and as the shape became familiar her face looked surprised and then stunned. Her mouth opened to ask a question...

“Empty the theatres save for clowns and furnish the rooms with glass walls and pretty colours running up and down the walls like confetti or blood or sherry or sauterne. You like baseball, don’t you, Montag?”

“Baseball’s a fine game.”

Now Beatty was almost invisible, a voice somewhere behind a screen of smoke

“What’s this?” asked Mildred, almost with delight. Montag heaved back against her arms. “What’s this here?”

“Sit down!” Montag shouted. She jumped away, her hands empty. “We’re talking!”

Beatty went on as if nothing had happened. “You like bowling, don’t you, Montag?”

“Bowling, yes.”

“And golf?”

“Golf is a fine game.”

“Basketball?”

“A fine game.”

“Billiards, pool? Football?”

“Fine games, all of them.”

“More sports for everyone, group spirit, fun, and you don’t have to think, eh? Organize and organize and superorganize super-super sports. More cartoons in books. More pictures. The mind drinks less and less. Impatience. Highways full of crowds going somewhere, somewhere, somewhere, nowhere. The gasoline refugee. Towns turn into motels, people in nomadic surges from place to place, following the moon tides, living tonight in the room where you slept this noon and I the night before.”

Mildred went out of the room and slammed the door. The parlour “aunts” began to laugh at the parlour “uncles.”

“Now let’s take up the minorities in our civilization, shall we? Bigger the population, the more minorities. Don’t step on the toes of the dog-lovers, the cat-lovers, doctors, lawyers, merchants, chiefs, Mormons, Baptists, Unitarians, second-generation Chinese, Swedes, Italians, Germans, Texans, Brooklynites, Irishmen, people from Oregon or Mexico. The people in this book, this play, this TV serial are not meant to represent any actual painters, cartographers, mechanics anywhere. The bigger your market, Montag, the less you handle controversy, remember that! All the minor minor minorities with their navels to be kept clean. Authors, full of evil thoughts, lock up your typewriters. They did. Magazines became a nice blend of vanilla tapioca. Books, so the damned snobbish critics said, were dishwater. No wonder books stopped selling, the critics said. But the public, knowing what it wanted, spinning happily, let the comic books survive. And the three-dimensional sex-magazines, of course. There you have it, Montag. It didn’t come from the Government down. There was no dictum, no declaration, no censorship, to start

with, no! Technology, mass exploitation, and minority pressure carried the trick, thank God. Today, thanks to them, you can stay happy all the time, you are allowed to read comics, the good old confessions, or trade journals.”

“Yes, but what about the firemen, then?” asked Montag.

“Ah.” Beatty leaned forward in the faint mist of smoke from his pipe. “What more easily explained and natural? With school turning out more runners, jumpers, racers, tinkerers, grabbers, snatchers, fliers, and swimmers instead of examiners, critics, knowers, and imaginative creators, the word ‘intellectual,’ of course, became the swear word it deserved to be. You always dread the unfamiliar. Surely you remember the boy in your own school class who was exceptionally ‘bright,’ did most of the reciting and answering while the others sat like so many leaden idols, hating him. And wasn’t it this bright boy you selected for beatings and tortures after hours? Of course it was. We must all be alike. Not everyone born free and equal, as the Constitution says, but everyone made equal. Each man the image of every other; then all are happy, for there are no mountains to make them cower, to judge themselves against. So! A book is a loaded gun in the house next door. Burn it. Take the shot from the weapon. Breach man’s mind. Who knows who might be the target of the well-read man? Me? I won’t stomach them for a minute. And so when houses were finally fireproofed completely, all over the world (you were correct in your assumption the other night) there was no longer need of firemen for the old purposes. They were given the new job, as custodians of our peace of mind, the focus of our understandable and rightful dread of being inferior; official censors, judges, and executors. That’s you, Montag, and that’s me.”

The door to the parlour opened and Mildred stood there looking in at them, looking at Beatty and then at Montag. Behind her

the walls of the room were flooded with green and yellow and orange fireworks sizzling and bursting to some music composed almost completely of trap-drums, tom-toms, and cymbals. Her mouth moved and she was saying something but the sound covered it.

Beatty knocked his pipe into the palm of his pink hand, studied the ashes as if they were a symbol to be diagnosed and searched for meaning.

“You must understand that our civilization is so vast that we can’t have our minorities upset and stirred. Ask yourself, What do we want in this country, above all? People want to be happy, isn’t that right? Haven’t you heard it all your life? I want to be happy, people say. Well, aren’t they? Don’t we keep them moving, don’t we give them fun? That’s all we live for, isn’t it? For pleasure, for titillation? And you must admit our culture provides plenty of these.”

“Yes.”

Montag could lip-read what Mildred was saying in the doorway. He tried not to look at her mouth, because then Beatty might turn and read what was there, too.

“Coloured people don’t like Little Black Sambo. Burn it. White people don’t feel good about Uncle Tom’s Cabin. Burn it. Someone’s written a book on tobacco and cancer of the lungs? The cigarette people are weeping? Burn the book. Serenity, Montag. Peace, Montag. Take your fight outside. Better yet, into the incinerator. Funerals are unhappy and pagan? Eliminate them, too. Five minutes after a person is dead he’s on his way to the Big Flue, the Incinerators serviced by helicopters all over the country. Ten minutes after death a man’s a speck of black dust. Let’s not quibble over individuals with memoriams. Forget them. Burn them all, burn everything. Fire is bright and fire is clean.”

The fireworks died in the parlour behind Mildred. She had stopped talking at the same time; a miraculous coincidence. Montag held his breath.

“There was a girl next door,” he said, slowly. “She’s gone now, I think, dead. I can’t even remember her face. But she was different. How – how did she happen?”

Beatty smiled. “Here or there, that’s bound to occur. Clarisse McClellan? We’ve a record on her family. We’ve watched them carefully. Heredity and environment are funny things. You can’t rid yourselves of all the odd ducks in just a few years. The home environment can undo a lot you try to do at school. That’s why we’ve lowered the kindergarten age year after year until now we’re almost snatching them from the cradle. We had some false alarms on the McClellans, when they lived in Chicago. Never found a book. Uncle had a mixed record; anti-social. The girl? She was a time bomb. The family had been feeding her subconscious, I’m sure, from what I saw of her school record. She didn’t want to know how a thing was done, but why. That can be embarrassing. You ask Why to a lot of things and you wind up very unhappy indeed, if you keep at it. The poor girl’s better off dead.”

“Yes, dead.”

“Luckily, queer ones like her don’t happen, often. We know how to nip most of them in the bud, early. You can’t build a house without nails and wood. If you don’t want a house built, hide the nails and wood. If you don’t want a man unhappy politically, don’t give him two sides to a question to worry him; give him one. Better yet, give him none. Let him forget there is such a thing as war. If the Government is inefficient, top-heavy, and tax-mad, better it be all those than that people worry over it. Peace, Montag. Give the people contests they win by remembering the words to more popular songs or the names of state capitals or how much corn Iowa grew last year.

Cram them full of non-combustible data, chock them so damned full of 'facts' they feel stuffed, but absolutely 'brilliant' with information. Then they'll feel they're thinking, they'll get a sense of motion without moving. And they'll be happy, because facts of that sort don't change. Don't give them any slippery stuff like philosophy or sociology to tie things up with. That way lies melancholy. Any man who can take a TV wall apart and put it back together again, and most men can nowadays, is happier than any man who tries to slide-rule, measure, and equate the universe, which just won't be measured or equated without making man feel bestial and lonely. I know, I've tried it; to hell with it. So bring on your clubs and parties, your acrobats and magicians, your dare-devils, jet cars, motor-cycle helicopters, your sex and heroin, more of everything to do with automatic reflex. If the drama is bad, if the film says nothing, if the play is hollow, sting me with the theremin, loudly. I'll think I'm responding to the play, when it's only a tactile reaction to vibration. But I don't care. I just like solid entertainment."

Beatty got up. "I must be going. Lecture's over. I hope I've clarified things. The important thing for you to remember, Montag, is we're the Happiness Boys, the Dixie Duo, you and I and the others. We stand against the small tide of those who want to make everyone unhappy with conflicting theory and thought. We have our fingers in the dyke. Hold steady. Don't let the torrent of melancholy and drear philosophy drown our world. We depend on you. I don't think you realize how important you are, to our happy world as it stands now."

Beatty shook Montag's limp hand. Montag still sat, as if the house were collapsing about him and he could not move, in the bed. Mildred had vanished from the door.

"One last thing," said Beatty. "At least once in his career, every fireman gets an itch. What do the books say, he wonders. Oh, to scratch that itch, eh? Well, Montag, take my word for it, I've had to

read a few in my time, to know what I was about, and the books say nothing! Nothing you can teach or believe. They're about non-existent people, figments of imagination, if they're fiction. And if they're non-fiction, it's worse, one professor calling another an idiot, one philosopher screaming down another's gullet. All of them running about, putting out the stars and extinguishing the sun. You come away lost."

"Well, then, what if a fireman accidentally, really not, intending anything, takes a book home with him?"

Montag twitched. The open door looked at him with its great vacant eye.

"A natural error. Curiosity alone," said Beatty. "We don't get over-anxious or mad. We let the fireman keep the book twenty-four hours. If he hasn't burned it by then, we simply come and burn it for him."

"Of course." Montag's mouth was dry.

"Well, Montag. Will you take another, later shift, today? Will we see you tonight perhaps?"

"I don't know," said Montag.

"What?" Beatty looked faintly surprised.

Montag shut his eyes. "I'll be in later. Maybe."

"We'd certainly miss you if you didn't show," said Beatty, putting his pipe in his pocket thoughtfully.

I'll never come in again, thought Montag.

"Get well and keep well," said Beatty.

He turned and went out through the open door.

Montag watched through the window as Beatty drove away in his gleaming yellow-flame-coloured beetle with the black, char-coloured tyres.

QUESTIONS ON COMPREHENSION

1. Discuss the gradual development of Montag throughout the plot. Compare and contrast him to Beatty.
2. Make a list of the people in the novel who contribute to Montag's growing self-awareness and explain what they teach him.
3. Explain the relation of the title of the book to its meaning.
4. Explain some of the futuristic (fantastic) technological advances seen in the novel.
5. Describe Mildred and contrast her to Montag and Clarisse.
6. What does the old lady represent to Montag and how does she affect him?
7. Is Beatty hypocritical? Fully explain your answer.
8. Dwell on the image of fire / burning and how it is repeatedly used in the novel.
9. Give a detailed description of the Mechanical Hound and how it is used. Do you feel it is effective? Why?
10. How does Bradbury build suspense in the novel? Why is the novel a tragedy? What one small ray of hope is there at the end?

Martian Chronicles

LOG ENTRY: SOL 41

I spent the day running full diagnostics on every system in the Hab. It was incredibly boring, but my survival depends on these machines, so it had to be done. I can't just assume an explosion did no long-term damage.

I did the most critical tests first. Number one was the integrity of the Hab canvas. I felt pretty confident it was in good shape, because I'd spent a few hours asleep in the rover before returning to the Hab, and the pressure was still good. The computer reported no change in pressure over that time, other than a minor fluctuation based on temperature.

Then I checked the oxygenator. If that stops working and I can't fix it, I'm a dead man. No problems.

Then the atmospheric regulator. Again, no problem.

Heating unit, primary battery array, O 2 and N 2 storage tanks, water reclaimer, all three airlocks, lighting systems, main computer... on and on I went, feeling better and better as each system proved to be in perfect working order.

Got to hand it to NASA...

August 2026: There will come soft rains

In the living room the voice-clock sang, *Tick-tock, seven o'clock, time to get up, time to get up, seven o'clock!* as if it were afraid that nobody would. The morning house lay empty. The clock ticked on, repeating and repeating its sounds into the emptiness. *Seven-nine, breakfast time, seven-nine!*

In the kitchen the breakfast stove gave a hissing sigh and ejected from its warm interior eight pieces of perfectly browned toast, eight eggs sunnyside up, sixteen slices of bacon, two coffees, and two cool glasses of milk.

"Today is August 4, 2026," said a second voice from the kitchen ceiling, "in the city of Allendale, California." It repeated the date three times for memory's sake. "Today is Mr. Featherstone's birthday. Today is the anniversary of Tilita's marriage. Insurance is payable, as are the water, gas, and light bills."

Somewhere in the walls, relays clicked, memory tapes glided under electric eyes.

Eight-one, tick-tock, eight-one o'clock, off to school, off to work, run, run, eight-one! But no doors slammed, no carpets took the soft tread of rubber heels. It was raining outside. The weather box on the front door sang quietly: "Rain, rain, go away; rubbers, raincoats for today..." And the rain tapped on the empty house, echoing.

Outside, the garage chimed and lifted its door to reveal the waiting car. After a long wait the door swung down again.

At eight-thirty the eggs were shriveled and the toast was like stone. An aluminum wedge scraped them into the sink, where hot water whirled them down a metal throat which digested and flushed them away to the distant sea. The dirty dishes were dropped into a hot washer and emerged twinkling dry.

Nine-fifteen, sang the clock, *time to clean.*

Out of warrens in the wall, tiny robot mice darted. The rooms were acrawl with the small cleaning animals, all rubber and metal. They thudded against chairs, whirling their mustached runners, kneading the rug nap, sucking gently at hidden dust. Then, like mysterious invaders, they popped into their burrows. Their pink electric eyes faded. The house was clean.

Ten o'clock. The sun came out from behind the rain. The house stood alone in a city of rubble and ashes. This was the one house left standing. At night the ruined city gave off a radioactive glow which could be seen for miles.

Ten-fifteen. The garden sprinklers whirled up in golden founts, filling the soft morning air with scatterings of brightness. The water pelted windowpanes, running down the charred west side where the house had been burned evenly free of its white paint. The entire west face of the house was black, save for five places. Here the silhouette in paint of a man mowing a lawn. Here, as in a photograph, a woman

bent to pick flowers. Still farther over, their images burned on wood in one titanic instant, a small boy, hands flung into the air; higher up, the image of a thrown ball, and opposite him a girl, hands raised to catch a ball which never came down.

The five spots of paint – the man, the woman, the children, the ball – remained. The rest was a thin charcoaled layer.

The gentle sprinkler rain filled the garden with falling light.

Until this day, how well the house had kept its peace. How carefully it had inquired, “Who goes there? What’s the password?” and, getting no answer from lonely foxes and whining cats, it had shut up its windows and drawn shades in an old-maidenly preoccupation with self-protection which bordered on a mechanical paranoia.

It quivered at each sound, the house did. If a sparrow brushed a window, the shade snapped up. The bird, startled, flew off! No, not even a bird must touch the house!

The house was an altar with ten thousand attendants, big, small, servicing, attending, in choirs. But the gods had gone away, and the ritual of the religion continued senselessly, uselessly.

Twelve noon.

A dog whined, shivering, on the front porch.

The front door recognized the dog voice and opened. The dog, once huge and fleshy, but now gone to bone and covered with sores, moved in and through the house, tracking mud. Behind it whirred angry mice, angry at having to pick up mud, angry at inconvenience.

For not a leaf fragment blew under the door but what the wall panels flipped open and the copper scrap rats flashed swiftly out. The offending dust, hair, or paper, seized in miniature steel jaws, was raced back to the burrows. There, down tubes which fed into the cellar, it was dropped into the sighing vent of an incinerator which sat like evil Baal in a dark corner.

The dog ran upstairs, hysterically yelping to each door, at last realizing, as the house realized, that only silence was here.

It sniffed the air and scratched the kitchen door. Behind the door, the stove was making pancakes which filled the house with a rich baked odor and the scent of maple syrup.

The dog frothed at the mouth, lying at the door, sniffing, its eyes turned to fire. It ran wildly in circles, biting at its tail, spun in a frenzy, and died. It lay in the parlor for an hour.

Two o'clock, sang a voice.

Delicately sensing decay at last, the regiments of mice hummed out as softly as blown gray leaves in an electrical wind.

Two-fifteen.

The dog was gone.

In the cellar, the incinerator glowed suddenly and a whirl of sparks leaped up the chimney.

Two thirty-five.

Bridge tables sprouted from patio walls. Playing cards fluttered onto pads in a shower of pips. Martinis manifested on an oaken bench with egg-salad sandwiches. Music played.

But the tables were silent and the cards untouched.

At four o'clock the tables folded like great butterflies back through the paneled walls.

Four-thirty.

The nursery walls glowed.

Animals took shape: yellow giraffes, blue lions, pink antelopes, lilac panthers cavorting in crystal substance. The walls were glass. They looked out upon color and fantasy. Hidden films clocked through well-oiled sprockets, and the walls lived. The nursery floor was woven to resemble a crisp, cereal meadow. Over this ran aluminum roaches and iron crickets, and in the hot still air butterflies

of delicate red tissue wavered among the sharp aroma of animal spoors! There was the sound like a great matted yellow hive of bees within a dark bellows, the lazy bumble of a purring lion. And there was the patter of okapi feet and the murmur of a fresh jungle rain, like other hoofs, falling upon the summer-starched grass. Now the walls dissolved into distances of parched weed, mile on mile, and warm endless sky. The animals drew away into thorn brakes and water holes.

It was the children's hour.

Five o'clock. The bath filled with clear hot water.

Six, seven, eight o'clock. The dinner dishes manipulated like magic tricks, and in the study a *click*. In the metal stand opposite the hearth where a fire now blazed up warmly, a cigar popped out, half an inch of soft gray ash on it, smoking, waiting.

Nine o'clock. The beds warmed their hidden circuits, for nights were cool here.

Nine-five. A voice spoke from the study ceiling:

"Mrs. McClellan, which poem would you like this evening?"

The house was silent.

The voice said at last, "Since you express no preference, I shall select a poem at random." Quiet music rose to back the voice. "Sara Teasdale. As I recall, your favorite..."

"There will come soft rains and the smell of the ground,
And swallows circling with their shimmering sound;

And frogs in the pools singing at night,
And wild plum trees in tremulous white;

Robins will wear their feathery fire,

Whistling their whims on a low fence-wire;

And not one will know of the war, not one
Will care at last when it is done.

Not one would mind, neither bird nor tree,
If mankind perished utterly;

And Spring herself, when she woke at dawn
Would scarcely know that we were gone.”

The fire burned on the stone hearth and the cigar fell away into a mound of quiet ash on its tray. The empty chairs faced each other between the silent walls, and the music played.

At ten o'clock the house began to die.

The wind blew. A falling tree bough crashed through the kitchen window. Cleaning solvent, bottled, shattered over the stove. The room was ablaze in an instant!

“Fire!” screamed a voice. The house lights flashed, water pumps shot water from the ceilings. But the solvent spread on the linoleum, licking eating under the kitchen door, while the voices took it up in chorus: “Fire, fire, fire!”

The house tried to save itself. Doors sprang tightly shut, but the windows were broken by the heat and the wind blew and sucked upon the fire.

The house gave ground as the fire in ten billion angry sparks moved with flaming ease from room to room and then up the stairs. While scurrying water rats squeaked from the walls, pistoled their water, and ran for more. And the wall sprays let down showers of mechanical rain.

But too late. Somewhere, sighing, a pump shrugged to a stop. The quenching rain ceased. The reserve water supply which had filled baths and washed dishes for many quiet days was gone.

The fire crackled up the stairs. It fed upon Picassos and Matisse's in the upper halls, like delicacies, baking off the oily flesh, tenderly crisping the canvases into black shavings.

Now the fire lay in beds, stood in windows, changed the colors of drapes!

And then, reinforcements.

From attic trapdoors, blind robot faces peered down with faucet mouths gushing green chemical.

The fire backed off, as even an elephant must at the sight of a dead snake. Now there were twenty snakes whipping over the floor, killing the fire with a clear cold venom of green froth.

But the fire was clever. It had sent flames outside the house, up through the attic to the pumps there. An explosion! The attic brain which directed the pumps was shattered into bronze shrapnel on the beams.

The fire rushed back into every closet and felt of the clothes hung there.

The house shuddered, oak bone on bone, its bared skeleton cringing from the heat, its wire, its nerves revealed as if a surgeon had torn the skin off to let the red veins and capillaries quiver in the scalded air. Help, help! Fire! Run, run! Heat snapped mirrors like the brittle winter ice. And the voices wailed Fire, fire, run, run, like a tragic nursery rhyme, a dozen voices, high, low, like children dying in a forest, alone, alone. And the voices fading as the wires popped their sheathings like hot chestnuts. One, two, three, four, five voices died.

In the nursery the jungle burned. Blue lions roared, purple giraffes bounded off. The panthers ran in circles, changing color, and

ten million animals, running before the fire, vanished off toward a distant steaming river...

Ten more voices died. In the last instant under the fire avalanche, other choruses, oblivious, could be heard announcing the time, playing music, cutting the lawn by remote-control mower, or setting an umbrella frantically out and in the slamming and opening front door, a thousand things happening, like a clock shop when each clock strikes the hour insanely before or after the other, a scene of maniac confusion, yet unity; singing, screaming, a few last cleaning mice darting bravely out to carry the horrid ashes away! And one voice, with sublime disregard for the situation, read poetry aloud in the fiery study, until all the film spools burned, until all the wires withered and the circuits cracked.

The fire burst the house and let it slam flat down, puffing out skirts of spark and smoke.

In the kitchen, an instant before the rain of fire and timber, the stove could be seen making breakfasts at a psychopathic rate, ten dozen eggs, six loaves of toast, twenty dozen bacon strips, which, eaten by fire, started the stove working again, hysterically hissing!

The crash. The attic smashing into kitchen and parlor. The parlor into cellar, cellar into sub-cellar. Deep freeze, armchair, film tapes, circuits, beds, and all like skeletons thrown in a cluttered mound deep under.

Smoke and silence. A great quantity of smoke.

Dawn showed faintly in the east. Among the ruins, one wall stood alone. Within the wall, a last voice said, over and over again and again, even as the sun rose to shine upon the heaped rubble and steam:

“Today is August 5, 2026, today is August 5, 2026, today is...”
(from *The Martian Chronicles*)

QUESTIONS ON COMPREHENSION

1. Define the genre of the text. Prove your point of view. What key is the short story written in? Account for the title of the short story.

2. The short story belongs to the so-called post-apocalyptic literature, describing the events after some world disaster. What was the disaster in this case? How does the author give clue to it?

3. Who is the main character of the story?

4. Find the examples of personification in the short story. Why is it so abundant in the text?

5. Define the following stylistic device: “The house was an altar with ten thousand attendants, big, small, servicing, attending, in choirs. But the gods had gone away, and the ritual of the religion continued senselessly, uselessly.” What is its purpose?

6. What is the role of the poem in the story?

7. Speak about the representation of the concept ‘time’ in the story. Why is it given so much attention to?

8. Describe the scene of the fire. Is it symbolic? How does the author convey the tense atmosphere of the episode?

Veldt

They walked down the hall of their soundproofed HappyLife Home, which had cost them thirty thousand dollars installed, this house which clothed and fed and rocked them to sleep and played and sang and was good to them. Their approach sensitized a switch somewhere and the nursery light flicked on when they came within ten feet of it. Similarly, behind them, in the halls, lights went on and off as they left them behind, with a soft automaticity.

“Well,” said George Hadley.

They stood on the thatched floor of the nursery. It was forty feet across by forty feet long and thirty feet high; it had cost half again as much as the rest of the house. "But nothing's too good for our children," George had said. The nursery was silent. It was empty as a jungle glade at hot high noon. The walls were blank and two dimensional. Now, as George and Lydia Hadley stood in the center of the room, the walls began to purr and recede into crystalline distance, it seemed, and presently an African veldt appeared, in three dimensions, on all sides, in color reproduced to the final pebble and bit of straw. The ceiling above them became a deep sky with a hot yellow sun.

He knew the principle of the room exactly. You sent out your thoughts. Whatever you thought would appear. "Let's have Aladdin and his lamp," he snapped. The veldtland remained; the lions remained.

One of the original uses of these nurseries was so that we could study the patterns left on the walls by the child's mind, study at our leisure, and help the child. In this case, however, the room has become a channel toward-destructive thoughts, instead of a release away from them.

"Matter of fact, we're thinking of turning the whole house off for about a month. Live sort of a carefree one-for-all existence."

"That sounds dreadful! Would I have to tie my own shoes instead of letting the shoe tier do it? And brush my own teeth and comb my hair and give myself a bath?"

"It would be fun for a change, don't you think?"

"No, it would be horrid. I didn't like it when you took out the picture painter last month."

"That's because I wanted you to learn to paint all by yourself, son."

“I don’t want to do anything but look and listen and smell; what else is there to do?”

And he marched about the house turning off the voice clocks, the stoves, the heaters, the shoe shiners, the shoe lacers, the body scrubbers and swabbers and massagers, and every other machine he could put his hand to. The house was full of dead bodies, it seemed. It felt like a mechanical cemetery. So silent. None of the humming hidden energy of machines waiting to function at the tap of a button.

Almost the End of the World

Sighting Rock Junction, Arisona, at noon on 22 August 1961, Willy Bersinger let his miner’s boot rest easy on the jalopy’s accelerator and talked quietly to his partner, Samuel Fitts.

‘Yes, sir, Samuel, it’s great hitting town. After a couple of months out at the mine, a juke-box looks like a stained-glass window to me. We need the town; without it, we might wake some morning and find ourselves all jerked beef and petrified rock. And then, of course, the town needs us, too.’

‘How’s that?’ asked Samuel Fitts.

‘Well, we bring things into the town that it hasn’t got – mountains, creeks, desert night, stars, things like that...’

And it was true, thought Willy, driving along. Set a man way out in the strange lands and he fills with wellsprings of silence. Silence of sagebrush, or a mountain lion purring like a warm beehive at noon. Silence of the river shallows deep in the canyons. All this a man takes in. Opening his mouth, in town, he breathes it out.

‘Oh, how I love to climb in that old barber-shop chair,’ Willy admitted. ‘And see all those city men lined up under the naked-lady calendars staring back at me, waiting while I chew over my philosophy of rocks and mirages and the kind of Time that just sits out there in the hills waiting for Man to go away. I exhale – and that

wilderness settles in a fine dust on the customers. Oh, it's nice, me talking, soft and easy, up and, on and on...'

It's good to feel wanted,' said Willy. 'You and me, Samuel, are basic necessities for those city-dwelling folks. Gangway, Rock Junction!'

And with a tremulous tin whistling they steamed across city limits into awe and wonder.

They had driven perhaps a hundred feet through town when Willy kicked the brakes. A great shower of flakes sifted from the jalopy fenders. The car stood cowering in the road.

'Something's wrong,' said Willy. He squinted his lynx eyes this way and that. He snuffed his huge nose. 'You feel it? You smell it?'

'Sure,' said Samuel, uneasily, 'but, what...?'

Willy scowled. 'You ever see a sky-blue cigar-store?'

'Never did'.

'There's one over there. Ever see a pink dog-kennel, an orange out-house, a lilac-coloured bird-bath? There, there, and over there!'

Both men had risen slowly now to stand on the creaking floorboards.

'Samuel,' whispered Willy. 'Every kindling pile, porchrail, gewgaw gingerbread, fence, fireplug, garbage truck, the whole blasted town, look at it! It was painted just an hour ago!'

'No!' said Samuel Fitts.

But there stood the band pavilion, the Baptist church, the firehouse, the orphanage, the railroad depot, the country jail, the cat hospital and the bungalows, cottages, greenhouses, shop-signs, mailboxes, telephone poles, and trash-bins, around and in between, and they all blazed with corn yellow, crab-apple greens, circus reds. From water-tank to tabernacle, each building looked as if God had jig-sawed it, coloured it, and set it out to dry a moment ago.

Not only that, but where weeds had always been, now cabbages, green onions, and lettuce crammed every yard, crowds of curious sunflowers clocked the noon sky, and pansies lay under unnumbered trees cool as summer puppies, their great damp eyes peering over rolled lawns mint-green as Irish travel posters. To top it all, ten boys, faces scrubbed, hair brilliantined, shirts, pants, and tennis shoes clean as chunks of snow raced by.

‘The town,’ said Willy, watching them run, ‘has gone mad. Mystery. Mystery everywhere. Samuel, what kind of tyrant’s come to power? What law was passed that keeps boys clean, drives people to paint every toothpick, every geranium pot? Smell that smell? There’s fresh wallpaper in all those houses! Doom in some horrible shape has tried and tested these people.’

The jalopy swerved around a corner through a wind that smelled of turpentine and whitewash. Samuel threw out a gum wrapper, snorting. He was somewhat surprised at what happened next. An old man in new overalls, with mirrorbright shoes, ran out in the street, grabbed the crumpled gum wrapper and shook his fist after the departing jalopy.

‘Doom...’ Samuel Fitts looked back, his voice fading.

‘Well... the bet still stands.’

They opened the door upon a barber-shop teeming with customers whose hair had already been cut and oiled, whose faces were shaved close and pink, yet who sat waiting to their shears and combs. A stock-market uproar filled the room as customers and barbers all talked at once.

When Willy and Samuel entered, the uproar ceased instantly. It was as if they had fired a shot-gun blast through the door.

‘Sam...Willy...’

In the silence some of the sitting men stood up and some of the standing men sat down, slowly, staring.

‘Samuel’, said Willy out of the corner of his mouth. ‘I feel like the Death standing here.’ Aloud he said, ‘Howdy! Here I am to finish my lecture on the “Interesting Flora and Fauna of the Great American Desert”, and –’

‘No’.

Antonelli, the head barber, rushed frantically at Willy, seized his arm, clapped his hand over Willy’s mouth like a snuffer on a candle.

‘Willy’, he whispered, looking apprehensively over his shoulder at his customers. ‘Promise me one thing: buy a needle and thread, sew up your lips. Silence, man, if you value your life!’

Willy and Samuel felt themselves hurried forward. Two already neat customers leapt out of barber chairs without being asked. As they stepped into the chairs, the two miners glimpsed their own images in the flyspecked mirror.

‘Samuel, there we are! Compare!’

‘Why,’ said Samuel, blinking, ‘we’re the only men in all Rock Junction who really need a shave and a haircut.’

‘Strangers!’ Antonelli laid them out in the chairs as if to anaesthetize them quickly. ‘You don’t know what strangers you are!’

‘Why, we’ve only been gone a couple of months...’ A steaming towel inundated Willy’s face; he subsided with muffled cries. In steaming darkness he heard Antonelli’s low and urgent voice.

‘We’ll fix you to look like everyone else. Not that the way you look is dangerous, no, but the kind of talk you miners talk might upset folks at a time like this...’

‘Time like this, hell! Willy lifted the seething towel. One bleary eye fixed Antonelli. ‘What’s wrong with Rock Junction?’

‘Not just Rock Junction.’ Antonelli gazed off at some incredible mirage beyond the horizon. ‘Phoenix, Tucson, Denver. All the cities in America! My wife and I are going as tourists to Chicago

next week. Imagine Chicago all painted and clean and new. The Pearl of the Orient they call it! Pittsburgh, Cincinnati, Buffalo, the same! All because... well... get up now, walk over, and switch on that television set against the wall.'

Willy handed Antonelli the steaming towel, walked over, switched on the television set, listened to it hum, fiddled with the dials, and waited. White snow drifted down the screen.

'Try the radio now', said Antonelli.

Willy felt everyone watch as he twisted the radio dial from station to station.

'Hell,' he said at last, 'both your television and radio are broken.'

'No' said Antonelli, simply.

Willy lay back down in the chair and closed his eyes.

Antonelli leaned forward, breathing hard.

'Listen,' he said.

'Imagine four weeks ago, a late Saturday morning, women and children staring at clowns and magicians on TV. In beauty shops, women staring at TV fashions. In the barber-shop and hardware stores, men staring at baseball or trout fishing. Everybody everywhere in the civilized world staring. No sound, no motion, except on the little black and white screens.

'And then, in the middle of all that staring...'

Antonelli paused to lift up one corner of the broiling cloth.

'Sunspots on the sun,' he said.

Willy stiffened.

'Biggest damn sunspots in the history of mortal man,' said Antonelli. 'Whole damn world flooded with electricity. Wiped every TV screen clear as a whistle, leaving nothing, and, after that, more nothing.'

His voice remote as the voice of a man describing an Arctic landscape. He lathered Willy's face not looking at what he was doing. Willy peered across the barber-shop, at the soft snow falling down and down that humming screen in an eternal winter. He could almost hear the rabbit-thumping of all the hearts in the shop.

Antonelli continued his funeral oration.

'It took us all that first day to realise what had happened. Two hours after that first sunspot storm hit, every TV repairman in the United States was on the road. Everyone figured it was only that night when newsboys, like in the old days, ran headlines through the streets that we got the shock about the sunspots maybe going on for the rest of our lives!'

The customers murmured.

Antonelli's hand, holding the razor, shook. He had to wait.

'All that blankness, that empty stuff falling down, falling down inside our television sets, oh, I tell you, it gave everyone the willies. It was like a good friend who talks to you in your front room and suddenly shuts up and lies there, pale, and you know he's dead and you begin to turn cold yourself.

'That first night, there was a run on the town's movie houses. Drug-store fizzed up two hundred vanilla, three hundred chocolate sodas that first night of the Calamity. But you can't buy movies and sodas every night. What then? Phone your in-laws for canasta or parchesi?

'Might as well,' observed Willy, 'blow your brains out. 'Sure, but people had to get out of their haunted houses. Walking through their parlours was like whistling past a graveyard. All that silence -'

Willy sat up a little. 'Speaking of silence -'

'On the third night,' said Antonelli, quickly, 'we were all still in shock. We were saved from outright lunacy by one woman. Somewhere in this town this woman strolled out of the house, and

came back a minute later. In one hand she held a paintbrush. And in the other...’

‘A bucket of paint’, said Willy.

‘Lord, it spread like wildfire!’ said Antonelli. ‘House to house, city to city. Jigsaw-puzzle craze, 1932; yo-yo craze, 1928, were nothing compared with the Everybody Do Everything Craze that blew this town to smithereens and glued it back again. Men everywhere slapped paint on anything that stood still ten seconds; men everywhere climbed steeples, straddled fences, fell off roofs and ladders by the hundreds. Women painted cupboards, closets; kids painted toys, wagons, kites. All towns, everywhere, the same, where people had forgotten how to waggle their jaws, make their own talk. I tell you, men were moving in mindless circles, dazed, until their wives shoved a brush in their hand and pointed them towards the nearest unpainted wall!’

‘Looks like you finished the job’, said Willy.

‘Paint stores ran out of paint three times the first week.’ Antonelli surveyed the town with pride. ‘The painting could only last so long, of course, unless you start painting hedges spraying grass blades one by one. Now that the attics and cellars are cleaned out, too, our fire is seeping off into well-women canning fruit again, making tomato pickles, raspberry, strawberry preserves. Basement shelves are loaded. Big doings, too. Organised bowling, box socials, beer busts. Music shop sold five hundred ukuleles, two hundred twelve steel guitars, four hundred sixty ocarinas and kazoos in four weeks. I’m studying trombone. Mac, there, the flute. Band concerts Thursday and Sunday nights. Hand-crank ice-cream machines? Bert Tyson’s sold two hundred last week alone. Twenty-eight days, Willy, twenty-eight days’.

Willy Bersinger and Samuel Fitts sat there, trying to imagine and feel the shock, the crushing blow.

‘Twenty-eight days, the barber-shop jammed with men, getting shaved twice a day so they can sit and stare at customers like they might say something’, said Antonelli, shaving Willy now. ‘Once, remember, before TV, barbers were supposed to be great talkers. Well, this month it took us one whole week to warm up, get the rust out. No quality, but our quantity is ferocious. When you came in you heard the commotion. Oh, it’ll simmer down when we get used to the great Oblivion...’

QUESTIONS ON COMPREHENSION

1. What is your idea of HappyLife Home? How do you imagine it? What was the principle of the room according to the text?

2. How did the House react when George and Lydia Hadley appeared in it?

3. Could you comment on “a channel toward-destructive thoughts, instead of a release away from them”; “That sounds dreadful! Would I have to tie my own shoes instead of letting the shoe tier do it? And brush my own teeth and comb my hair and give myself a bath?”

4. How did the House change during the narration? What did it look like?

5. What do you associate veldt with? Can you account for the title of the story?

6. How long were the miners out of town? Why did the miners need the town and why did the town need them? What was wrong with the town?

7. What did Antonelli tell Willy and Samuel about what had happened in American cities? Why didn’t TV sets work in the town?

8. What was Rock Junction like with the television / without television? What is the author's opinion about the social role of television?

9. Can we judge from the story if people need TV or not? How does the author bring the idea to the reader?

10. What does the author mean by the "great Oblivion", the "Calamity"? What idea stands behind these lines?

DAN BROWN

Dan Brown is the author of numerous bestselling novels, including The Da Vinci Code, which has become one of the best selling novels of all time as well as the subject of intellectual debate among readers and scholars. Brown's novels are published in 56 languages around the world with over 200 million copies in print.

In 2005, Brown was named one of the 100 Most Influential People in the World by TIME Magazine, whose editors credited him with "keeping the publishing industry afloat; renewed interest in Leonardo da Vinci and early Christian history; spiking tourism to Paris and Rome; a growing membership in secret societies; the ire of Cardinals in Rome; eight books denying the claims of the novel and seven guides to read along with it; a flood of historical thrillers; and a major motion picture franchise."

The son of a mathematics teacher and a church organist, Brown was raised on a prep school campus where he developed a fascination with the paradoxical interplay between science and religion. These themes eventually formed the backdrop for his books. He is a graduate of Amherst College and Phillips Exeter Academy, where he later returned to teach English before focusing his attention full time to writing. He lives in New England with his yellow lab, Winston.

Brown's latest novel, Origin, explores two of the fundamental questions of humankind: Where do we come from? Where are we going?

Digital Fortress

... After passing through endless security checks and being issued a six-hour, holographic guest pass, he was escorted to a plush research facility where he was told he would spend the afternoon providing 'blind support' to the Cryptography Division – an elite group of mathematical brainiacs known as the code-breakers.

For the first hour, the cryptographers seemed unaware Becker was even there. They hovered around an enormous table and spoke a language Becker had never heard. They spoke of stream ciphers, self-decimated generators, knapsack variants, zero knowledge protocols, unicity points. Becker observed, lost. They scrawled symbols on graph paper, pored over computer printouts, and continuously referred to the jumble of text on the overhead projector...

Eventually one of them explained what Becker had already surmised. The scrambled text was a code – a 'ciphertext' – groups of numbers and letters representing encrypted words. The cryptographers' job was to study the code and extract from it the original message, or 'cleartext'. The NSA had called Becker because they suspected the original message was written in Mandarin Chinese; he was to translate the symbols as the cryptographers decrypted them.

For two hours, Becker interpreted an endless stream of Mandarin symbols. But each time he gave them a translation, the cryptographers shook their heads in despair. Apparently the code was not making sense. Eager to help, Becker pointed out that all the characters they'd shown him had a common trait – they were also part of the Kanji language. Instantly the bustle in the room fell silent.

The man in charge, a lanky chain-smoker named Morante, turned to Becker in disbelief.

‘You mean these symbols have multiple meanings?’

Becker nodded. He explained that Kanji was a Japanese writing system based on modified Chinese characters. He’d been giving Mandarin translations because that’s what they’d asked for.

‘Jesus Christ’. Morante coughed. ‘Let’s try the Kanji.’

Like magic, everything fell into place.

The cryptographers were duly impressed, but nonetheless, they still made Becker work on the characters out of sequence. ‘It’s for your own safety’, Morante said. ‘This way, you won’t know what you’re translating’.

Becker laughed. Then he noticed nobody else was laughing.

When the code finally broke, Becker had no idea what dark secrets he’d helped reveal, but one thing was for certain – the NSA took code-breaking seriously; the check in Becker’s pocket was more than an entire month’s university salary.

Inside the Clínica de Salud Pública, visiting hours were over. The gymnasium lights had been turned out. Pierre Cloucharde was fast asleep. He did not see the figure hunched over him. The needle of a stolen syringe glinted in the dark. Then it disappeared into the IV tube just above Cloucharde’s wrist. The hypodermic contained 30 cc of cleaning fluid stolen from a janitor’s cart. With great force, a strong thumb rammed the plunger down and forced the bluish liquid into the old man’s veins.

Cloucharde was awake only for a few seconds. He might have screamed in pain had a strong hand not been clamped across his mouth. He lay trapped on his cot, pinned beneath a seemingly immovable weight. He could feel the pocket of fire searing its way

up his arm. There was an excruciating pain traveling through his armpit, his chest, and then, like a million shattering pieces of glass, it hit his brain. Cloucharde saw a brilliant flash of light... and then nothing.

The visitor released his grip and peered through the darkness at the name on the medical chart. Then he slipped silently out.

On the street, the man in wire-rim glasses reached to a tiny device attached to his belt. The rectangular pack was about the size of a credit card. It was a prototype of the new Monocle computer. Developed by the U.S. Navy to help technicians record battery voltages in cramped quarters on submarines, the miniature computer packed a cellular modem and the newest advances in microtechnology. Its visual monitor was a transparent liquid crystal display, mounted in the left lens of a pair of eyeglasses. The Monocle reflected a whole new age in personal computing; the user could now look through his data and still interact with the world around him.

The Monocle's real coup, though, was not its miniature display but rather its data entry system. A user entered information via tiny contacts fixed to his fingertips; touching the contacts together in sequence mimicked a shorthand similar to court stenography. The computer would then translate the shorthand into English.

The killer pressed a tiny switch, and his glasses flickered to life. His hands inconspicuously at his sides, he began touching different fingertips together in rapid succession. A message appeared before his eyes.

SUBJECT P. CLOUCHARDE – TERMINATED

He smiled. Transmitting notification of kills was part of his assignment. But including victims' names ... that, to the man in the wire-rim glasses, was elegance. His fingers flashed again, and his cellular modem activated.

MESSAGE SENT

The crypto door beeped once, waking Susan from her depressing reverie. The door had rotated past its fully open position and would be closed again in five seconds, having made a complete 360-degree rotation. Susan gathered her thoughts and stepped through the opening. A computer made note of her entry.

Although she had practically lived in Crypto since its completion three years ago, the sight of it still amazed her. The main room was an enormous circular chamber that rose five stories. Its transparent, domed ceiling towered 120 feet at its central peak. The Plexiglas cupola was embedded with a polycarbonate mesh – a protective web capable of withstanding a two-megaton blast. The screen filtered the sunlight into delicate lacework across the walls. Tiny particles of dust drifted upward in wide unsuspecting spirals – captives of the dome’s powerful deionizing system.

The room’s sloping sides arched broadly at the top and then became almost vertical as they approached eye level. Then they became subtly translucent and graduated to an opaque black as they reached the floor – a shimmering expanse of polished black tile that shone with an eerie luster, giving one the unsettling sensation that the floor was transparent. Black ice.

Pushing through the center of the floor like the tip of a colossal torpedo was the machine for which the dome had been built. Its sleek black contour arched twenty-three feet in the air before plunging back into the floor below. Curved and smooth, it was as if an enormous killer whale had been frozen mid breach in a frigid sea.

This was TRANSLTR, the single most expensive piece of computing equipment in the world—a machine the NSA swore did not exist.

Like an iceberg, the machine hid 90 percent of its mass and power deep beneath the surface. Its secret was locked in a ceramic silo that went six stories straight down – a rocketlike hull surrounded by a winding maze of catwalks, cables, and hissing exhaust from the freon cooling system. The power generators at the bottom droned in a perpetual low-frequency hum that gave the acoustics in Crypto a dead, ghostlike quality.

TRANSLTR, like all great technological advancements, had been a child of necessity. During the 1980s, the NSA witnessed a revolution in telecommunications that would change the world of intelligence reconnaissance forever – public access to the Internet. More specifically, the arrival of E-mail.

Criminals, terrorists, and spies had grown tired of having their phones tapped and immediately embraced this new means of global communication. E-mail had the security of conventional mail and the speed of the telephone. Since the transfers traveled through underground fiber-optic lines and were never transmitted into the airwaves, they were entirely intercept-proof – at least that was the perception.

In reality, intercepting E-mail as it zipped across the Internet was child's play for the NSA's techno-gurus. The Internet was not the new home computer revelation that most believed. It had been created by the Department of Defense three decades earlier – an enormous network of computers designed to provide secure government communication in the event of nuclear war. The eyes and ears of the NSA were old Internet pros. People conducting illegal business via E-mail quickly learned their secrets were not as private as they'd thought. The FBI, DEA, IRS, and other U.S. law enforcement agencies – aided by the NSA's staff of wily hackers – enjoyed a tidal wave of arrests and convictions.

Of course, when the computer users of the world found out the U.S. government had open access to their E-mail communications, a cry of outrage went up. Even pen pals, using E-mail for nothing more than recreational correspondence, found the lack of privacy unsettling. Across the globe, entrepreneurial programmers began working on a way to keep E-mail more secure. They quickly found one and public-key encryption was born.

Public-key encryption was a concept as simple as it was brilliant. It consisted of easy-to-use, home-computer software that scrambled personal E-mail messages in such a way that they were totally unreadable. A user could write a letter and run it through the encryption software, and the text would come out the other side looking like random nonsense – totally illegible – a code. Anyone intercepting the transmission found only an unreadable garble on the screen.

The only way to unscramble the message was to enter the sender's "pass-key" – a secret series of characters that functioned much like a PIN number at an automatic teller. The pass-keys were generally quite long and complex; they carried all the information necessary to instruct the encryption algorithm exactly what mathematical operations to follow to create the original message.

A user could now send E-mail in confidence. Even if the transmission was intercepted, only those who were given the key could ever decipher it.

The NSA felt the crunch immediately. The codes they were facing were no longer simple substitution ciphers crackable with pencil and graph paper – they were computer-generated hash functions that employed chaos theory and multiple symbolic alphabets to scramble messages into seemingly hopeless randomness.

At first, the pass-keys being used were short enough for the NSA's computers to "guess." If a desired pass-key had ten digits, a

computer was programmed to try every possibility between 0000000000 and 9999999999. Sooner or later the computer hit the correct sequence. This method of trial-and-error guessing was known as “brute force attack.” It was time-consuming but mathematically guaranteed to work.

As the world got wise to the power of brute-force code-breaking, the pass-keys started getting longer and longer. The computer time needed to “guess” the correct key grew from weeks to months and finally to years.

By the 1990s, pass-keys were over fifty characters long and employed the full 256-character ASCII alphabet of letters, numbers, and symbols. The number of different possibilities was in the neighborhood of 10¹²⁰—ten with 120 zeros after it. Correctly guessing a pass-key was as mathematically unlikely as choosing the correct grain of sand from a three-mile beach. It was estimated that a successful brute-force attack on a standard sixty-four-bit key would take the NSA’s fastest computer – the top-secret Cray / Josephson II – over nineteen years to break. By the time the computer guessed the key and broke the code, the contents of the message would be irrelevant.

Caught in a virtual intelligence blackout, the NSA passed a top-secret directive that was endorsed by the President of the United States. Buoyed by federal funds and a carte blanche to do whatever was necessary to solve the problem, the NSA set out to build the impossible: the world’s first universal code-breaking machine.

Despite the opinion of many engineers that the newly proposed code-breaking computer was impossible to build, the NSA lived by its motto: Everything is possible. The impossible just takes longer.

Five years, half a million man-hours, and \$1.9 billion later, the NSA proved it once again. The last of the three million, stamp-size processors was hand-soldered in place, the final internal

programming was finished, and the ceramic shell was welded shut. TRANSLTR had been born.

Although the secret internal workings of TRANSLTR were the product of many minds and were not fully understood by any one individual, its basic principle was simple: Many hands make light work.

Its three million processors would all work in parallel-counting upward at blinding speed, trying every new permutation as they went. The hope was that even codes with unthinkable colossal pass-keys would not be safe from TRANSLTR's tenacity. This multibillion-dollar masterpiece would use the power of parallel processing as well as some highly classified advances in clear text assessment to guess pass-keys and break codes. It would derive its power not only from its staggering number of processors but also from new advances in quantum computing-an emerging technology that allowed information to be stored as quantum-mechanical states rather than solely as binary data.

The moment of truth came on a blustery Thursday morning in October. The first live test. Despite uncertainty about how fast the machine would be, there was one thing on which the engineers agreed – if the processors all functioned in parallel, TRANSLTR would be powerful. The question was how powerful.

The answer came twelve minutes later. There was a stunned silence from the handful in attendance when the printout sprang to life and delivered the cleartext – the broken code. TRANSLTR had just located a sixty-four-character key in a little over ten minutes, almost a million times faster than the two decades it would have taken the NSA's second-fastest computer.

Led by the deputy director of operations, Commander Trevor J. Strathmore, the NSA's Office of Production had triumphed. TRANSLTR was a success. In the interest of keeping their success a

secret, Commander Strathmore immediately leaked information that the project had been a complete failure. All the activity in the Crypto wing was supposedly an attempt to salvage their \$2 billion fiasco. Only the NSA elite knew the truth – TRANSLTR was cracking hundreds of codes every day.

With word on the street that computer-encrypted codes were entirely unbreakable – even by the all-powerful NSA – the secrets poured in. Drug lords, terrorists, and embezzlers alike – weary of having their cellular phone transmissions intercepted – were turning to the exciting new medium of encrypted E-mail for instantaneous global communications. Never again would they have to face a grand jury and hear their own voice rolling off tape, proof of some long-forgotten cellular phone conversation plucked from the air by an NSA satellite.

Intelligence gathering had never been easier. Codes intercepted by the NSA entered TRANSLTR as totally illegible ciphers and were spit out minutes later as perfectly readable plaintext. No more secrets.

To make their charade of incompetence complete, the NSA lobbied fiercely against all new computer encryption software, insisting it crippled them and made it impossible for lawmakers to catch and prosecute the criminals. Civil rights groups rejoiced, insisting the NSA shouldn't be reading their mail anyway. Encryption software kept rolling off the presses. The NSA had lost the battle – exactly as it had planned. The entire electronic global community had been fooled ... or so it seemed.

QUESTIONS ON COMPREHENSION

1. Define the genre of the text. Prove your point of view.
2. Expand on social problems touched upon in the selection and the writer's comment.

3. Can you account for the ample use of digits, numerals, dates, numbers, etc. in the text?

4. Give your review of the language of the selection (peculiarities of syntactical structure, choice of words, graphical means, including punctuation, length of paragraphs, type), mark specific stylistic devices and traits of American English.

ARTHUR CLARKE

Arthur C. Clarke (in full Sir Arthur Charles Clarke, born December 16, 1917, Minehead, Somerset, England – died March 19, 2008, Colombo, Sri Lanka), English writer, notable for both his science fiction and his nonfiction. His best known works are the script he wrote with American film director Stanley Kubrick for 2001: A Space Odyssey (1968) and the novel of that film.

Clarke was interested in science from childhood, but he lacked the means for higher education. In 1934 he joined the British Interplanetary Society (BIS), a small advanced group that advocated the development of rocketry and human space exploration. From 1941 to 1946 Clarke served in the Royal Air Force, becoming a radar instructor and technician. In 1945 he wrote an article entitled “Extra-Terrestrial Relays” for Wireless World. The article envisioned a communications satellite system that would relay radio and television signals throughout the world; this system was in operation two decades later. He began selling short stories in 1946 to science fiction magazines in the United States and Britain.

In 1948 Clarke secured a bachelor of science degree from King’s College in London. His first nonfiction books were Interplanetary Flight (1950) and The Exploration of Space (1951). His first novels were routine stories of space exploration: Prelude to Space (1951), about the first flight to the Moon; The Sands of Mars

(1951), about the colonization of that planet; and *Islands in the Sky* (1952), set on a space station.

Clarke's next novel, *Childhood's End* (1953), is regarded as one of his best and dealt with how first contact with aliens sparks an evolutionary transformation in humanity. Clarke would return to the themes of first contact and evolutionary leaps throughout his career.

In the 1950s Clarke wrote two short stories that became science fiction classics: *The Nine Billion Names of God* (1953) and the Hugo Award-winning *The Star* (1955).

Beginning in 1964, Clarke worked with director Stanley Kubrick on adapting Clarke's short story "The Sentinel" (1951) into a movie, which eventually became the hugely successful *2001: A Space Odyssey* (1968). Clarke wrote a novel based on the script, and both he and Kubrick were nominated for an Academy Award for their script. *2001: A Space Odyssey* is often cited by film critics and historians as one of the greatest films of all time.

Clarke was one of science fiction's leading figures, and he and American authors Isaac Asimov and Robert Heinlein were called the "Big Three." His other books include: *A Meeting with Medusa* (1971), *Imperial Earth* (1975), *The Fountains of Paradise* (1979), *The Songs of Distant Earth* (1986). Clarke also wrote two sequels to *2001: A Space Odyssey* during this time: *2010: Odyssey Two* (1982, filmed 1984) and *2061: Odyssey Three* (1988).

A. Clarke was knighted in 2000.

2001: A Space Odyssey

Floyd sat down (one still tended to do so, even when weightless) and read the notice several times. When he was sure that there had been no modifications since his last trip, he pressed the START button.

Close at hand, an electric motor began to whirr, and Floyd felt himself moving. As the notice advised him to do, he closed his eyes and waited. After a minute, a bell chimed softly and he looked around.

The light had now changed to a soothing pinkish-white; but, more important, he was under gravity again.

Only the faintest vibration revealed that it was a spurious gravity, caused by the carrousel-like spin of the whole toilet compartment. Floyd picked up a piece of soap, and watched it drop in slow motion; he judged that the centrifugal force was about a quarter of a normal gravity. But that was quite enough; it would ensure that everything moved in the right direction, in the one place where this mattered most.

He pressed the STOP FOR EXIT button, and closed his eyes again. Weight slowly ebbed as the rotation ceased, the bell gave a double chime, and the red warning light was back. The door was then locked in the right position to let him glide out into the cabin, where he adhered as quickly as possible to the carpet. He had long ago exhausted the novelty of weightlessness, and was grateful for the Velcro slippers that allowed him to walk almost normally.

There was plenty to occupy his time, even if he did nothing but sit and read. When he tired of official reports and memoranda and minutes, he would plug his foolscap-sized Newspad into the ship's information circuit and scan the latest reports from Earth. One by one he would conjure up the world's major electronic papers; he knew the codes of the more important ones by heart, and had no need to consult the list on the back of his pad. Switching to the display unit's short-term memory, he would hold the front page while he quickly searched the headlines and noted the items that interested him.

Each had its own two-digit reference; when he punched that, the postagestamp-sized rectangle would expand until it neatly filled

the screen and he could read it with comfort. When he had finished, he would flash back to the complete page and select a new subject for detailed examination.

Floyd sometimes wondered if the Newspad, and the fantastic technology behind it, was the last word in man's quest for perfect communications. Here he was, far out in space, speeding away from Earth at thousands of miles an hour, yet in a few milliseconds he could see the headlines of any newspaper he pleased. (That very word "newspaper," of course, was an anachronistic hangover into the age of electronics.) The text was updated automatically on every hour; even if one read only the English versions, one could spend an entire lifetime doing nothing but absorbing the ever-changing flow of information from the news satellites.

It was hard to imagine how the system could be improved or made more convenient. But sooner or later, Floyd guessed, it would pass away, to be replaced by something as unimaginable as the Newspad itself would have been to Caxton or Gutenberg.

There was another thought which a scanning of those tiny electronic headlines often invoked. The more wonderful the means of communication, the more trivial, tawdry, or depressing its contents seemed to be. Accidents, crimes, natural and man-made disasters, threats of conflict, gloomy editorials – these still seemed to be the main concern of the millions of words being sprayed into the ether. Yet Floyd also wondered if this was altogether a bad thing; the newspapers of Utopia, he had long ago decided, would be terribly dull.

QUESTIONS ON COMPREHENSION

1. Why did Floyd read the notice several times before pressing the START button?

2. What did Floyd usually do being tired of official reports and memoranda?

3. What was the last word in man's quest for perfect communications?

4. What was an anachronistic hangover into the age of electronics?

5. What do such names as Caxton or Gutenberg represent in the text?

ERNEST CLINE

Ernest Christy Cline (born March 29, 1972) is an American science fiction novelist, slam poet, and screenwriter. He wrote the novels Ready Player One and Armada and co-wrote the screenplay for the film adaptation of Ready Player One, directed by Steven Spielberg.

Cline was born and raised in Ashland, Ohio, the son of Faye Imogene and Ernest Christy Cline. As a youth in the 1970s and 1980s, Cline was "addicted to video games and movies", especially Star Wars, the films of John Hughes, and the tabletop roleplaying game Dungeons & Dragons. He worked in information technology in his twenties and worked on screenwriting in his spare time.

In June 2010, Cline sold his first novel, Ready Player One, a book that takes place in a dystopian vision of the 2040s. The book is about a kid who tries to solve the keys to find a billionaire's wealth in a sort of competition. The book was sold in a bidding war to the Crown Publishing Group (a division of Random House). The film rights to the novel were sold the following day, to Warner Bros., with Cline co-writing the screenplay. Ten months later, with the hardcover release coinciding with the paperback release, Cline revealed on his blog that both the paperback and hardcover editions

of Ready Player One contain an elaborately hidden Easter egg. This clue formed the first part of a series of staged video gaming tests, similar to the plot of the novel. Cline also revealed that the competition's grand prize would be a 1981 DeLorean. The prize was awarded in 2012. The paperback is currently in its 17th printing.

Ready Player One

“This,” Halliday says, pointing to the screen with genuine reverence, “was the very first videogame Easter egg. Robinett hid it in his game’s code without telling a soul, and Atari manufactured and shipped Adventure all over the world without knowing about the secret room. They didn’t find out about the Easter egg’s existence until a few months later, when kids all over the world began to discover it. I was one of those kids, and finding Robinett’s Easter egg for the first time was one of the coolest videogaming experiences of my life.”

The young Halliday drops his joystick and stands. As he does, the living room fades away, and the scene shifts again. Halliday now stands in a dim cavern, where light from unseen torches flickers off the damp walls.

In the same instant, Halliday’s appearance also changes once again, as he morphs into his famous OASIS avatar, Anorak – a tall, robed wizard with a slightly more handsome version of the adult Halliday’s face (minus the eyeglasses). Anorak is dressed in his trademark black robes, with his avatar’s emblem (a large calligraphic letter “A”) embroidered on each sleeve.

“Before I died,” Anorak says, speaking in a much deeper voice, “I created my own Easter egg, and hid it somewhere inside my most popular videogame – the OASIS. The first person to find my Easter egg will inherit my entire fortune.”

<...>

I pulled out my laptop and powered it on. It was a bulky, heavy beast, almost ten years old. I'd found it in a trash bin behind the abandoned strip mall across the highway. I'd been able to coax it back to life by replacing its system memory and reloading the stone-age operating system.

The processor was slower than a sloth by current standards, but it was fine for my needs. The laptop served as my portable research library, video arcade, and home theater system. Its hard drive was filled with old books, movies, TV show episodes, song files, and nearly every videogame made in the twentieth century.

QUESTIONS ON COMPREHENSION

1. What was one of the coolest videogaming experiences of the main character's life?
2. How did the videogame Easter egg work?
3. How did the character depict the gadget found in a trash bin behind the abandoned strip mall across the highway?
4. In what way did he manage to repair it?
5. What was the main character's attitude to the laptop?

MICHAEL CRICHTON

Michael Crichton was a writer and filmmaker, best known as the author of Jurassic Park and the creator of ER. His latest posthumous novel, MICRO, was released on November 22, 2011.

Crichton graduated summa cum laude from Harvard College, received his MD from Harvard Medical School, and was a postdoctoral fellow at the Salk Institute for Biological Studies, researching public policy with Jacob Bronowski. He taught courses in anthropology at Cambridge University and writing at MIT.

Crichton's 2004 bestseller, State of Fear, acknowledged the world was growing warmer, but challenged extreme anthropogenic warming scenarios.

Crichton's interest in computer modeling went back forty years. His multiple-discriminant analysis of Egyptian crania, carried out on an IBM 7090 computer at Harvard, was published in the Papers of the Peabody Museum in 1966.

Crichton's first bestseller, The Andromeda Strain, was published while he was still a medical student. He later worked full time on film and writing. One of the most popular writers in the world, he has sold over 200 million books. His books have been translated into thirty-eight languages and thirteen have been made into films.

He had a lifelong interest in computers. His feature film Westworld was the first to employ computer-generated special effects back in 1973. Crichton's pioneering use of computer programs for film production earned him a Technical Achievement Academy Award in 1995.

Crichton won an Emmy, a Peabody, and a Writer's Guild of America Award for ER. In 2002, a newly discovered ankylosaur was named for him: Crichtonsaurus bohlini.

Disclosure

Sanders stared. The message hadn't come to him from inside the company at all. He was looking at an Internet routing. Internet was the vast worldwide computer network connecting universities, corporations, government agencies, and private users. Sanders wasn't knowledgeable about the Internet, but it appeared that the message from "Afriend," network name CHARON, had originated from UWA.PCM.COM.EDU, wherever that was. Apparently some kind of educational institution. He pushed thePRINT SCREENbutton, and

made a mental note to turn this one over to Bosak. He needed to talk to Bosak anyway.

He went down the hall and got the sheet as it came out of the printer. Then he went back to his office and stared at the screen. He decided to try a reply to this person.

FROM: TSANDERS@DCC.COM
TO: CHARON@UWA.PCM.COM.EDU
ANY HELP GREATLY APPRECIATED.

SANDERS

He pushed theSENDbutton. Then he deleted both the original message and his own reply.

SORRY, YOU CANNOT DELETE THIS MAIL.

Sometimes e-mail was protected with a flag that prevented it from being deleted. He typed:UNPROTECT MAIL.

THE MAIL IS UNPROTECTED.

He typed: DELETE MAIL.

SORRY, YOU CANNOT DELETE THIS MAIL.

What the hell is this? he thought. The system must be hanging up. Maybe it had been stymied by the Internet address. He decided to delete the message from the system at the control level. He typed: SYSTEM.

WHAT LEVEL?

He typed: SYSOP

SORRY, YOUR PRIVILEGES DO NOT INCLUDE SYSOP CONTROL.

‘Christ,’ he said. They’d gone in and taken away his privileges. He couldn’t believe it.

He typed: SHOW PRIVILEGES.

SANDERS, THOMAS L.

PRIOR USER LEVEL: 5 (SYSOP)

USER LEVEL CHANGE: TUE JUNE 16 4:50 PM PST

CURRENT USER LEVEL: 0 (ENTRY)

NO FURTHER MODIFICATIONS

There it was: they had locked him out of the system. User level zero was the level that assistants in the company were given.

Sanders slumped back in the chair. He felt as if he had been fired. For the first time, he began to realize what this was going to be like.

Clearly, there was no time to waste. He opened his desk drawer, and saw at once that the pens and pencils were neatly arranged. Someone had already been there. He pulled open the file drawer below. Only a half-dozen files were there; the others were all missing.

They had already gone through his desk.

Quickly, he got up and went out to the big filing cabinets behind Cindy's desk. These cabinets were locked, but he knew Cindy kept the key in her desk. He found the key, and unlocked the current year's files.

The cabinet was empty. There were no files there at all. They had taken everything.

He opened the cabinet for the previous year: empty.

The year before: empty.

All the others: empty.

Jesus, he thought. No wonder Cindy had been so cool. They must have had a gang of workmen up there with trolleys, cleaning everything out during the afternoon.

Sanders locked the cabinets again, replaced the key in Cindy's desk, and headed downstairs.

The press office was on the third floor. It was deserted now except for a single assistant, who was closing up. "Oh. Mr. Sanders. I was just getting ready to leave."

"You don't have to stay. I just wanted to check some things. Where do you keep the back issues of ComLine?"

"They're all on that shelf over there." She pointed to a row of stacked issues. "Was there anything in particular?"

"No. You go ahead home."

The assistant seemed reluctant, but she picked up her purse and headed out the door. Sanders went to the shelf. The issues were arranged in six-month stacks. Just to be safe, he started ten stacks back-five years ago.

The conference room was packed. There were fifteen Conley-White executives down one side of the table, with John Marden in

the middle, and fifteen DigiCom executives down the other side, with Garvin in the middle.

Meredith Johnson stood at the head of the table and said, "Next, we'll hear from Tom Sanders. Tom, I wonder if you could review for us where we stand with the Twinkle drive. What is the status of our production there?"

"Of course, Meredith." Sanders stood, his heart pounding. He walked to the front of the room. "By way of background, Twinkle is our code name for a stand-alone CD-ROM drive player which we expect to be revolutionary." He turned to the first of his charts. "CD-ROM is a small laser disk used to store data. It is cheap to manufacture, and can hold an enormous amount of information in any form-words, images, sound, video, and so on. You can put the equivalent of six hundred books on a single small disk, or, thanks to our research here, an hour and a half of video. And any combination. For example, you could make a textbook that combines text, pictures, short movie sequences, animated cartoons, and so on. Production costs will soon be at ten cents a unit."

He looked down the table. The Conley-White people were interested. Garvin was frowning. Meredith looked tense.

"But for CD-ROM to be effective, two things need to happen. First, we need a portable player. Like this." He held up the player, and then passed it down the Conley-White side.

"A five-hour battery, and an excellent screen. You can use it on a train, a bus, or in a classroom-anywhere you can use a book."

The executives looked at it, turned it over in their hands. Then they looked back at Sanders.

"The other problem with CD-ROM technology," Sanders said, "is that it's slow. It's sluggish getting to all that wonderful data. But the Twinkle drives that we have successfully made in prototype are twice as fast as any other drive in the world. And with added

memory for our packing and unpacking images, it is as quick as a small computer. We expect to get the unit cost for these drives down to the price of a video-game unit within a year. And we are manufacturing the drives now. We have had some early problems, but we are solving them.”

Meredith said, “Can you tell us more about that? I gather from talking to Arthur Kahn that we’re still not clear on why the drives have problems.”

“Actually, we are,” Sanders said. “It turns out that the problems aren’t serious at all. I expect them to be entirely resolved in a matter of days.”

“Really.” She raised her eyebrows. “Then we’ve found what the trouble is?”

“Yes, we have.”

“That’s wonderful news.”

“Yes, it is.”

“Very good news indeed,” Ed Nichols said. “Was it a design problem?”

“No,” Sanders said. “There’s nothing wrong with the design we made here, just as there was nothing wrong with the prototypes. What we have is a fabrication problem involving the production line in Malaysia.”

“What sort of problems?”

“It turns out,” Sanders said, “that we don’t have the proper equipment on the line. We should be using automatic chip installers to lock the controller chips and the RAM cache on the board, but the Malays on the line have been installing chips by hand. Literally pushing them in with their thumbs. And it turns out that the assembly line is dirty, so we’re getting particulate matter in the split optics. We should have level-seven air handlers, but we only have level-five handlers installed. And it turns out that we should be ordering

components like hinge rods and clips from one very reliable Singapore supplier, but the components are actually coming from another supplier. Less expensive, less reliable.”

Meredith looked uneasy, but only for a moment. “Improper equipment, improper conditions, improper components...” She shook her head. “I’m sorry. Correct me if I’m wrong, but didn’t you set up that line, Tom?”

“Yes, I did,” Sanders said. “I went out to Kuala Lumpur last fall and set it up with Arthur Kahn and the local foreman, Mohammed Jafar.”

“Then how is it that we have so many problems?”

“Unfortunately, there was a series of bad judgment calls in setting up the line.”

Meredith looked concerned. “Tom, we all know that you’re extremely competent. How could this have happened?”

Sanders hesitated.

This was the moment.

“It happened because the line was changed,” he said. “The specifications were altered.”

“Altered? How?”

“I think that’s something for you to explain to this group, Meredith,” he said. “Since you ordered the changes.”

“I ordered them?”

“That’s right, Meredith.”

“Tom, you must be mistaken,” she said coolly. “I haven’t had anything to do with that Malaysia line.”

“Actually, you have,” Sanders said. “You made two trips there, in November and December of last year.”

“Two trips to Kuala Lumpur, yes. Because you mishandled a labor dispute with the Malaysian government. I went there and

resolved the dispute. But I had nothing to do with the actual production line.”

“I’d say you’re mistaken, Meredith.”

“I assure you,” she said coldly. “I am not. I had nothing to do with the line, and any so-called changes.”

“Actually, you went there and inspected the changes you ordered.”

“I’m sorry, Tom. I didn’t. I’ve never even seen the actual line.”

On the screen behind her, the videotape of the newscast began to play silently with the sound off. The newscaster in coat and tie speaking to the camera.

Sanders said, “You never went to the plant itself?”

“Absolutely not, Tom. I don’t know who could have told you such a thing or why you would say it now.”

The screen behind the newscaster showed the DigiCom building in Malaysia, then the interior of the plant. The camera showed the production lines and an official inspection tour taking place. They saw Phil Blackburn, and alongside him, Meredith Johnson. The camera moved in on her as she chatted with one of the workers.

There was a murmur in the room.

Meredith spun around and looked. “This is outrageous. This is out of context. I don’t know where this could have come from.”

“Malaysia Channel Three. Their version of the BBC. I’m sorry, Meredith.” The newscast segment finished and the screen went blank. Sanders made a gesture, and Cindy began moving around the table, handing a manila folder to each person.

Meredith said, “Wherever this so-called tape came from...”

Sanders said, “Ladies and gentlemen, if you will open your packets, you will find the first of a series of memos from the Operations Review Unit, which was under the direction of Ms.

Johnson in the period in question. I direct your attention to the first memo, dated November eighteenth of last year. You will notice that it has been signed by Meredith Johnson, and it stipulates that the line will be changed to accommodate the labor demands of the Malay government. In particular, this first memo states that automated chip installers will not be included, but that this work will be done by hand. That made the Malay government happy, but it meant we couldn't manufacture the drives."

Johnson said, "But you see, what you are overlooking is that the Malays gave us no choice..."

"In that case, we should never have built the plant there," Sanders said, cutting her off. "Because we can't manufacture the intended product at those revised specifications. The tolerances are inadequate."

Johnson said, "Well, that may be your own opinion..."

"The second memo, dated December third, indicates that a cost-savings review diminished air-handling capacities on the line. Again, this is a variance in the specifications that I established. Again, it is critical—we can't manufacture high-performance drives under these conditions. The long and the short of it is that these decisions doomed the drives to failure."

"Now look," Johnson said. "If anybody believes that the failure of these drives is anything but your..."

"The third memo," Sanders said, "summarizes cost savings from the Operations Review Unit. You'll see that it claims an eleven percent reduction in operating costs. That savings has already been wiped out by fabrication delays, not counting our time-to-market delay costs. Even if we immediately restore the line, this eleven percent savings translates into a production cost increase, over the run, of nearly seventy percent. First year, it's a hundred and ninety percent increase."

“Now the next memo,” Sanders said, “explains why this cost-cutting was adopted in the first place. During acquisition talks between Mr. Nichols and Ms. Johnson in the fall of last year, Ms. Johnson indicated she would demonstrate that it was possible to reduce high-technology development costs, which were a source of concern to Mr. Nichols when they were meeting at...”

“Oh Christ,” Ed Nichols said, staring at the paper.

Meredith pushed forward, stepping in front of Sanders. “Excuse me, Tom,” she said, speaking firmly, “but I really must interrupt you. I’m sorry to have to say this, but no one here is fooled by this little charade.” She swept her arm wide, encompassing the room. “Or by your so-called evidence.” She spoke more loudly. “You weren’t present when these management decisions were carefully taken by the best minds in this company. You don’t understand the thinking that lies behind them. And the false postures you are striking now, the so-called memos that you are holding up to convince us... No one here is persuaded.” She gave him a pitying look. “It’s all empty, Tom. Empty words, empty phrases. When it comes right down to it, you’re all show and no substance. You think you can come in here and second-guess the management team? I’m here to tell you that you can’t.”

Garvin stood abruptly, and said, “Meredith...”

“Let me finish,” Meredith said. She was flushed, angry. “Because this is important, Bob. This is the heart of what is wrong with this division. Yes, there were some decisions taken that may be questionable in retrospect. Yes, we tried innovative procedures which perhaps went too far. But that hardly excuses the behavior we see today. This calculated, manipulative attitude by an individual who will do anything-anything at all – to get ahead, to make a name for herself at the expense of others, who will savage the reputation of anyone who stands in her path – I mean, that stands in his path – this

ruthless demeanor that we are seeing... No one is fooled by this, Tom. Not for a minute. We're being asked to accept the worst kind of fraudulence. And we simply won't do it. It's wrong. This is all wrong. And it is bound to catch up with you. I'm sorry. You can't come here and do this. It simply won't work – it hasn't worked. That's all."

She stopped to catch her breath and looked around the table. Everyone was silent, motionless. Garvin was still standing; he appeared to be in shock. Slowly, Meredith seemed to realize that something was wrong. When she spoke again, her voice was quieter.

"I hope that I have... that I have accurately expressed the sentiments of everyone here. That's all I intended to do."

There was another silence. Then Garvin said, "Meredith, I wonder if you would leave the room for a few minutes."

Stunned, she stared at Garvin for a long moment. Then she said, "Of course, Bob."

"Thank you, Meredith."

Walking very erect, she left the room. The door clicked shut behind her.

John Marden sat forward and said, "Mr. Sanders, please continue with your presentation. In your view, how long will it be until the line is repaired and fully functioning?"

QUESTIONS ON COMPREHENSION

1. What problem did Sanders face?
2. Why did Sanders feel as if he had been fired?
3. What did Sanders immediately realize when he opened his desk drawer?
4. Whom did Sanders meet in the press office?
5. How did Sanders feel at the Conference room?

6. Why was CD-ROM drive player expected to be revolutionary?

7. What fabrication problem involving the production line in Malaysia did Sanders tell about? How did he manage to persuade that it had not been his fault?

8. What was Meredith's reaction to Sanders speech? What did she finally realize?

9. How did the meeting at the Conference room finish? What made Garvin come to such a decision?

PHILIP KINDRED DICK

*Philip K. Dick was born in Chicago in 1928 and lived most of his life in California. In 1952, he began writing professionally and proceeded to write numerous novels and short-story collections. He won the Hugo Award for the best novel in 1962 for *The Man in the High Castle* and the John W. Campbell Memorial Award for best novel of the year in 1974 for *Flow My Tears, the Policeman Said*. Philip K. Dick died on March 2, 1982, in Santa Ana, California, of heart failure following a stroke.*

*In addition to 44 published novels, Dick wrote approximately 121 short stories, most of which appeared in science fiction magazines during his lifetime. Although Dick spent most of his career as a writer in near-poverty, ten of his stories have been adapted into popular films since his death, including *Blade Runner*, *Total Recall*, *A Scanner Darkly*, *Minority Report*, *Paycheck*, *Next*, *Screamers*, and *The Adjustment Bureau*. In 2005, *Time* magazine named *Ubik* one of the one hundred greatest English-language novels published since 1923. In 2007, Dick became the first science fiction writer to be included in *The Library of America* series.*

At the time of his death, Dick's work was generally known to only science fiction readers, and many of his novels and short stories were out of print. To date, a total of 44 novels, 121 short stories, and 14 short story collections have been published and translations have appeared in 25 languages. Six volumes of selected correspondence, written by Dick from 1938 through 1982, were published between 1991 and 2009.

After the war, the UN began to actively promote emigration to extraterrestrial colonies in order to protect humanity from the harmful effects of radioactive dust. As an additional incentive, each emigrant as a worker-servant was provided with a free android (derogatory called Andy) of any brand, of his choice.

Androids are used only on colony planets, but many of them escape, killing their masters, and go to Earth to free themselves from their slavish position. Androids are completely biological creatures and physically almost indistinguishable from humans. Due to the fact that the cells of their body are not able to divide, androids live no more than four years.

Do Androids Dream of Electric Sheep?

A merry little surge of electricity piped by automatic alarm from the mood organ beside his bed awakened Rick Deckard. Surprised – it always surprised him to find himself awake without prior notice – he rose from the bed, stood up in his multicolored pajamas, and stretched. Now, in her bed, his wife Iran opened her gray, unmerry eyes, blinked, then groaned and shut her eyes again.

“You set your Penfield too weak,” – he said to her. “I’ll reset it and you’ll be awake and -”

“Keep your hand off my settings.” Her voice held bitter sharpness. “I don’t want to be awake.”

He seated himself beside her, bent over her, and explained softly. “If you set the surge up high enough, you’ll be glad you’re awake; that’s the whole point. At setting C it overcomes the threshold barring consciousness, as it does for me.” Friendlily, because he felt well-disposed toward the world his setting had been at D – he patted her bare, pate shoulder.

“Get your crude cop’s hand away,” Iran said.

“I’m not a cop –” He felt irritable, now, although he hadn’t dialed for it.

“You’re worse,” his wife said, her eyes still shut. “You’re a murderer hired by the cops.”

“I’ve never killed a human being in my life.” His irritability had risen, now; had become outright hostility.

Iran said, “Just those poor andys.”

“I notice you’ve never had any hesitation as to spending the bounty money I bring home on whatever momentarily attracts your attention.” He rose, strode to the console of his mood organ. “Instead of saving,” he said, “so we could buy a real sheep, to replace that fake electric one upstairs. A mere electric animal, and me earning all that I’ve worked my way up to through the years.” At his console he hesitated between dialing for a thalamic suppressant (which would abolish his mood of rage) or a thalamic stimulant (which would make him irked enough to win the argument).

“If you dial,” Iran said, eyes open and watching, “for greater venom, then I’ll dial the same. I’ll dial the maximum and you’ll see a fight that makes every argument we’ve had up to now seem like nothing. Dial and see; just try me.” She rose swiftly, loped to the console of her own mood organ, stood glaring at him, waiting.

He sighed, defeated by her threat. “I’ll dial what’s on my schedule for today.” Examining the schedule for January 3, 1992, he saw that a businesslike professional attitude was called for. “If I dial

by schedule,” he said warily, “will you agree to also?” He waited, canny enough not to commit himself until his wife had agreed to follow suit.

“My schedule for today lists a six-hour self-accusatory depression,” Iran said.

“What? Why did you schedule that?” It defeated the whole purpose of the mood organ. “I didn’t even know you could set it for that,” he said gloomily.

“I was sitting here one afternoon,” Iran said, “and naturally I had tamed on Buster Friendly and His Friendly Friends and he was talking about a big news item he’s about to break and then that awful commercial came on, the one I hate; you know, for Mountibank Lead Codpieces. And so for a minute I shut off the sound. And I heard the building, this building; I heard the —” She gestured.

“Empty apartments,” Rick said. Sometimes he heard them at night when he was supposed to be asleep. And yet, for this day and age a one-half occupied conapt building rated high in the scheme of population density; out in what had been before the war the suburbs one could find buildings entirely empty... or so he had heard. He had let the information remain secondhand; like most people he did not care to experience it directly.

“At that moment,” Iran said, “when I had the TV sound off, I was in a 382 mood; I had just dialed it. So although I heard the emptiness intellectually, I didn’t feel it. My first reaction consisted of being grateful that we could afford a Penfield mood organ. But then I read how unhealthy it was, sensing the absence of life, not just in this building but everywhere, and not reacting – do you see? I guess you don’t. But that used to be considered a sign of mental illness; they called it ‘absence of appropriate affect.’ So I left the TV sound off and I sat down at my mood organ and I experimented. And I finally found a setting for despair.” Her dark, pert face showed satisfaction,

as if she had achieved something of worth. “So I put it on my schedule for twice a month; I think that’s a reasonable amount of time to feel hopeless about everything, about staying here on Earth after everybody who’s small has emigrated, don’t you think?”

“But a mood like that,” Rick said, “you’re apt to stay in it, not dial your way out. Despair like that, about total reality, is self-perpetuating.”

“I program an automatic resetting for three hours later,” his wife said sleekly.

“A 481. Awareness of the manifold possibilities open to me in the future; new hope that —” “I know 481,” he interrupted. He had dialed out the combination many times; he relied on it greatly. “Listen,” he said, seating himself on his bed and taking hold of her hands to draw her down beside him, “even with an automatic cutoff it’s dangerous to undergo a depression, any kind. Forget what you’ve scheduled and I’ll forget what I’ve scheduled; we’ll dial a 104 together and both experience it, and then you stay in it while I reset mine for my usual businesslike attitude. That way I’ll want to hop up to the roof and check out the sheep and then head for the office; meanwhile I’ll know you’re not sitting here brooding with no TV.” He released her slim, long fingers, passed through the spacious apartment to the living room, which smelled faintly of last night’s cigarettes. There he bent to turn on the TV.

From the bedroom Iran’s voice came. “I can’t stand TV before breakfast.”

“Dial 888,” Rick said as the set warmed. “The desire to watch TV, no matter what’s on it.”

“I don’t feel like dialing anything at all now,” Iran said.

“Then dial 3,” he said.

“I can’t dial a setting that stimulates my cerebral cortex into wanting to dial! If I don’t want to dial, I don’t want to dial that most

of all, because then I will want to dial, and wanting to dial is right now the most alien drive I can imagine; I just want to sit here on the bed and stare at the floor.” Her voice had become sharp with overtones of bleakness as her soul congealed and she ceased to move, as the instinctive, omnipresent film of great weight, of an almost absolute inertia, settled over her.

He turned up the TV sound, and the voice of Buster Friendly boomed out and filled the room. “ – ho ho, folks. Time now for a brief note on today’s weather. The Mongoose satellite reports that fallout will be especially pronounced toward noon and will then taper off, so all you folks who’ll be venturing out –”

Appearing beside him, her long nightgown trailing wispily, Iran shut off the TV set. “Okay, I give up; I’ll dial. Anything you want me to be; ecstatic sexual bliss – I feel so bad I’ll even endure that. What the hell. What difference does it make?”

“I’ll dial for both of us, Rick said, and led her back into the bedroom. There, at her console, he dialed 594: pleased acknowledgment of husband’s superior wisdom in all matters. On his own console he dialed for a creative and fresh attitude toward his job, although this he hardly needed; such was his habitual, innate approach without recourse to Penfield artificial brain stimulation.

The Nexus-6 did have two trillion constituents plus a choice within a range of ten million possible combinations of cerebral activity. In .45 of a second an android equipped with such a brain could assume any one of fourteen basic reaction-postures. Well, no intelligence test could trap such an andy. But then, intelligence tests hadn’t trapped an andy in years, not since the primordial, crude varieties of the 1970’s.

The Nexus-6 android types, Rick reflected, surpassed several classes of human specials in terms of intelligence. In other words,

androids equipped with the new Nexus-6 brain unit had from a sort of rough pragmatic standpoint evolved beyond a major – but inferior – segment of mankind... But new scales of achievement, for example the Voight-Kampf Empathy test, had emerged as criteria by which to judge. An android, no matter how gifted as to pure intellectual capacity, could make no sense out of the fusion which took place routinely among the followers of Mercerism – an experience which he, and virtually everyone else, including subnormal chickenheads, managed with no difficulty.

The electric mechanism, within its compellingly authentic-style gray pelt, gurgled and blew bubbles, its vileness glassy, its metal jaws locked together. This had always amazed him, these “disease” circuits built into false animals; the construct which he now held on his lap had been put together in such a fashion that when a primary component misfired, the whole thing appeared – not broken – but organically ill. It would have fooled me, Isidore said to himself as he groped within the ersatz stomach fur for the concealed control panel (quite small on this variety of false animal) plus the quick-charge battery terminals. He could find neither. Nor could he search very long: the mechanism had almost failed. If it does consist of a short, he reflected, which is busy burning out circuits, then maybe I should try to detach one of the battery cables; the mechanism will shut down, but no more harm will be done.

QUESTIONS ON COMPREHENSION

1. What awakened Rick Deckard in the morning? What surprised him?
2. Why was Rick Deckard’s wife Iran irritated that morning? How did Rick explain the situation to her?

3. Will you comment on the following: “*He rose, strode to the console of his mood organ. “Instead of saving we could buy a real sheep, to replace that fake electric one upstairs. A mere electric animal, and me earning all that I’ve worked my way up to through the years.” At his console he hesitated between dialing for a thalamic suppressant (which would abolish his mood of rage) or a thalamic stimulant (which would make him irked enough to win the argument).”*

4. How does the author describe the relationships between the main characters?

5. What function did the Nexus-6 android types surpass several classes of human specials?

WAYNE GLADSTONE

Wayne Gladstone (also known as Gladstone) is an American writer, humorist and novelist perhaps best known for his work with Cracked.com and the novel Notes from the Internet Apocalypse, the first in a trilogy of books entitled The Internet Apocalypse Trilogy.

Following the release of Notes from the Internet Apocalypse, Gladstone has been interviewed on the internet’s effect on pop culture by Esquire, as well as appearing on Fusion.net in an interview hypothesizing the societal effects of the disappearance of the Internet.

The second novel in Gladstone’s Internet apocalypse trilogy, Agents of the Internet Apocalypse, was released on July 21, 2015.

Notes From the Internet Apocalypse

DAY 1. THE HAPPENING

When the great crash happened it was nothing like we feared. There was no panic. No tears. Mostly just slammed fists and

swearing. The Internet was down, and hitting refresh didn't work. "Ctrl, alt, delete" was also useless. No one had Internet. Anywhere.

And we didn't know why. Electricity, running water, and even television were all unaffected. But Internet Explorer mocked us with an endless hourglass, and Firefox just kept suggesting an update that never came. Mac users were confident Safari would never fail them, but it did. Although, because the Internet was down, no one tweeted "UGH! Safari! FAIL!"

We went to sleep that night with no e-mails sent. No statuses updated. And millions of men all over the world checked that secret panel in their basement wall to see if their old Jenna Jameson DVDs were still there to play them to sleep. Tomorrow, we thought, would be a new day.

DAY 2. THE WAITING

Some woke at dawn. Not on purpose, but withdrawal can be a bitch. They were the first to see that nothing had changed. A few walked out bewildered into the rain. Others remembered that television still had things called weathermen, who advised them to take an umbrella on days like this. By 9:00 A.M., our mood was best characterized as one of bemused frustration with actual panic still an arm's-length away. Many offices canceled work. It was like getting a technological snow day, and swapping the Internet for some time off seemed like a fair trade at the time.

Personally, I was in favor of anything that relieved me of my duties at the New York Workers' Compensation Board. Seven years ago, I had overseen the turning of our department into a fully paperless office. The thought of coming back to a desk flooded with photocopies and interoffice memos delivered in scribble-scratched envelopes was too much to bear. Not just the work, but the return to a place that no longer showed any sign of my one accomplishment. My more recent (and last) attempt at greatness was met with less

approval. I wrote a memo two years ago suggesting that the state could save millions in worker compensation payments if it delivered free and mandatory antidepressants to all its employees (including employees of the workers' compensation offices) to prevent all the disability claims stemming from crippling workplace-induced depression and, of course, botched suicide attempts.

"You realize this is your job, right, Gladstone?" Noonan asked, curling my memo in his hands. "It's not a place for your jokes, regardless of what you've got going on in your life."

I studied the comb marks in his polished gray hair, not fully understanding.

"It wasn't a joke," I answered, but it hadn't really been a question.

By then, no one asked me questions. Like when there had been a change in office policy about Internet use. An interoffice e-mail sent to all employees, but it might as well have been sent only to me with a cc to the others solely for shaming purposes. A reminder that the Internet was to be used only for work-based reasons. Certain websites I'd frequented had been blocked. Nothing wildly NSFW, but things that couldn't be justified either. Noonan dropped my suggestion on my desk and walked away.

So I was happy to stay home, and did so with a clear conscience, knowing that not everything was broken. After all, my Scotch had yet to suffer any technical difficulties. I poured myself two fingers of The Macallan, pleased with my alcohol-based observation, and considered using it to update my Facebook status before remembering that would be impossible.

DAY 7. TAKING NOTES

One week now and I'm trying to keep this journal on more of a daily basis. As real-time as life will allow. I like the writing. Without work and the Internet, I need something to keep me busy. I focus on

the pen scratching paper. It directs my mind and steadies my pulse. I can express any idea I want without some Twitter character limit or fear of a “TL;DR” comment following. Still, I miss the tiny dose of fame that comes from being heard online, where comments are tethered to content people are already reading, and statuses appear instantly on your friends’ screens. There’s a comfort that comes from knowing people are already staring at the pond when you cast your pebble. Knowing there are witnesses to the ripple before it expands out into nothing. So I play a little game and pretend others will read this. That I have a story worth telling. Otherwise, I might as well go to the gym or do crossword puzzles until the Web comes back.

I should go grocery shopping, but I keep thinking FreshDirect is going to be up and running again.

QUESTIONS ON COMPREHENSION

1. What did people feel when the great crash happened? What did they suffer from most of all?

2. How did people occupy themselves at first at the beginning of the Internet Apocalypse? What did people prefer to do to keep them busy?

3. The sentence “*When the great crash happened it was nothing like we feared*” is repeated twice in the text. Will you explain, why? What did people fear most of all?

4. Compare the story “Notes From the Internet Apocalypse” written by Wayne Gladstone to Ray Bradbury’s story “Almost the End of the World”.

ROBERT A. HEINLEIN

Robert Anson Heinlein (July 7, 1907 – May 8, 1988) was an American science fiction author, aeronautical engineer, and naval officer. Sometimes called the “dean of science fiction writers”, he was among the first to emphasize scientific accuracy in his fiction, and was thus a pioneer of the subgenre of hard science fiction. His published works, both fiction and non-fiction, express admiration for competence and emphasize the value of critical thinking. His plots often posed provocative situations which challenged conventional social mores. His work continues to have an influence on the science-fiction genre, and on modern culture more generally.

*Heinlein became one of the first American science-fiction writers to break into mainstream magazines such as *The Saturday Evening Post* in the late 1940s. He was one of the best-selling science-fiction novelists for many decades, and he, Isaac Asimov, and Arthur C. Clarke are often considered the “Big Three” of English-language science fiction authors. Notable Heinlein works include *Stranger in a Strange Land*, *Starship Troopers* (which helped mold the space marine and mecha archetypes) and *The Moon Is a Harsh Mistress*.*

Heinlein used his science fiction as a way to explore provocative social and political ideas, and to speculate how progress in science and engineering might shape the future of politics, race, religion. Within the framework of his science-fiction stories, Heinlein repeatedly addressed certain social themes: the importance of individual liberty and self-reliance, the obligation individuals owe to their societies, the influence of organized religion on culture and government, and the tendency of society to repress nonconformist thought. He also speculated on the influence of space travel on human cultural practices.

Heinlein was named the first Science Fiction Writers Grand

Master in 1974. Four of his novels won Hugo Awards. In addition, fifty years after publication, seven of his works were awarded “Retro Hugos” – awards given retrospectively for works that were published before the Hugo Awards came into existence. In his fiction, Heinlein coined terms that have become part of the English language, including grok, waldo and speculative fiction, as well as popularizing existing terms like “TANSTAAFL”, “pay it forward”, and “space marine”. He also anticipated mechanical computer-aided design with “Drafting Dan” and described a modern version of a waterbed in his novel Beyond This Horizon. In the first chapter of the novel Space Cadet he anticipated the cellular phone, 35 years before Motorola invented the technology. Several of Heinlein's works have been adapted for film and television.

Waldo and Magic, Inc.

It may plausibly be urged that the shape of a culture – its mores, evaluations, family organizations, eating habits, living patterns, pedagogical methods, institutions, forms of government, and so forth – arise from the economic necessities of its technology. Even though the thesis may be too broad and much oversimplified, it is nonetheless true that much which characterized the long peace which followed the constitutional establishment of the United Nations grew out of the technologies which were hothouse-forced by the needs of the belligerents in the war of the forties. Up to that time broadcast and beamcast were used only for commercial radio, with rare exceptions. Even telephony was done almost entirely by actual metallic connection from one instrument to another. If a man in Monterey wished to speak to his wife or partner in Boston, a physical, copper neuron stretched bodily across the continent from one to the other.

Radiant power was then a hop dream, found in Sunday supplements and comic books.

A concatenation – no, a meshwork – of new developments was necessary before the web of copper covering the continent could be dispensed with. Power could not be broadcast economically; it was necessary to wait for the co-axial beam – a direct result of the imperative military shortages of the Great War. Radio telephony could not replace wired telephony until ultra microwave techniques made room in the ether, so to speak, for the traffic load. Even then it was necessary to invent a tuning device which could be used by a nontechnical person – a ten-year-old child, let us say – as easily as the dial selector which was characteristic of the commercial wired telephone of the era then terminating.

Bell Laboratories cracked that problem; the solution led directly to the radiant power receptor, domestic type, keyed, sealed, and metered. The way was open for commercial radio power transmission – except in one respect: efficiency. Aviation waited on the development of the Otto-cycle engine; the Industrial Revolution waited on the steam engine; radiant power waited on a really cheap, plentiful power source. Since radiation of power is inherently wasteful, it was necessary to have power cheap and plentiful enough to waste.

The same year brought atomic energy. The physicists working for the United States Army – the United States of North America had its own army then – produced a super-explosive; the notebooks recording their tests contained, when properly correlated, everything necessary to produce almost any other sort of nuclear reaction, even the so-called Solar Phoenix, the hydrogen-helium cycle, which is the source of the sun's power.

Radiant power became economically feasible – and inevitable.

The reaction whereby copper is broken down into phosphorus, silicon²⁹ and helium³, plus degenerating chain reactions, was one of the several cheap and convenient means developed for producing unlimited and practically free power.

Of course Stevens included none of this in his explanation to Grimes. Grimes was absent-mindedly aware of the whole dynamic process; he had seen radiant power grow up, just as his grandfather had seen the development of aviation. He had seen the great transmission lines removed from the sky – “mined” for their copper; he had seen the heavy cables being torn from the dug-up streets of Manhattan. He might even recall his first independent-unit radiotelephone with its somewhat disconcerting double dial – he had gotten a lawyer in Buenos Aires on it when attempting to reach his neighborhood delicatessen. For two weeks he made all his local calls by having them relayed back from South America before he discovered that it made a difference which dial he used first.

At that time Grimes had not yet succumbed to the new style in architecture. The London Plan did not appeal to him; he liked a house aboveground, where he could see it. When it became necessary to increase the floor space in his offices, he finally gave in and went subsurface, not so much for the cheapness, convenience, and general all-around practicability of living in a tri-conditioned cave, but because he had already become a little worried about the possible consequences of radiation pouring through the human body. The fused-earth walls of his new residence were covered with lead; the roof of the cave had a double thickness. His hole in the ground was as near radiation-proof as he could make it.

“– the meat of the matter,” Stevens was saying, “is that the delivery of power to transportation units has become erratic as the devil. Not enough yet to tie up traffic, but enough to be very

disconcerting. There have been some nasty accidents; we can't keep hushing them up forever. I've got to do something about it."

"Why?"

"'Why?' Don't be silly. In the first place as traffic engineer for NAPA my bread and butter depends on it. In the second place the problem is upsetting in itself. A properly designed piece of mechanism ought to work – all the time, every time. These don't, and we can't find out why not. Our staff mathematical physicists have about reached the babbling stage."

Grimes shrugged. Stevens felt annoyed by the gesture. "I don't think you appreciate the importance of this problem, Doc. Have you any idea of the amount of horsepower involved in transportation? Counting both private and commercial vehicles and common carriers, North American Power-Air supplies more than half the energy used in this continent. We have to be right. You can add to that our city-power affiliate. No trouble there – yet. But we don't dare think what a city-power breakdown would mean."

"I'll give you a solution."

"Yeah? Well, give."

"Junk it. Go back to oil-powered and steam-powered vehicles. Get rid of these damned radiant-powered deathtraps."

"Utterly impossible. You don't know what you're saying. It took more than fifteen years to make the changeover. Now we're geared to it. Gus, if NAPA closed up shop, half the population of the northwest seaboard would starve, to say nothing of the lake states and the Philly-Boston axis."

"Hrrmph – well, all I've got to say is that that might be better than the slow poisoning that is going on now."

Stevens brushed it away impatiently. "Look, Doc, nurse a bee in your bonnet if you like, but don't ask me to figure it into my calculations. Nobody else sees any danger in radiant power."

Grimes answered mildly. “Point is, son, they aren’t looking in the right place. Do you know what the high jump record was last year?”

“I never listen to the sport news.”

“Might try it sometime. The record leveled off at seven foot two, ’bout twenty years back. Been dropping ever since. You might try graphing athletic records against radiation in the air – artificial radiation. Might find some results that would surprise you.”

“Shucks, everybody knows there has been a swing away from heavy sports. The sweat-and-muscles fad died out, that’s all. We’ve simply advanced into a more intellectual culture.”

“Intellectual, hogwash! People quit playing tennis and such because they are tired all the time. Look at you. You’re a mess.”

“Don’t needle me, Doc.”

“Sorry. But there has been a clear deterioration in the performance of the human animal. If we had decent records on such things I could prove it, but any physician who’s worth his salt can see it, if he’s got eyes in him and isn’t wedded to a lot of fancy instruments. I can’t prove what causes it, not yet, but I’ve a damned good hunch that it’s caused by the stuff you peddle.”

“Impossible. There isn’t a radiation put on the air that hasn’t been tested very carefully in the bio labs. We’re neither fools nor knaves.”

“Maybe you don’t test ’em long enough. I’m not talking about a few hours, or a few weeks; I’m talking about the cumulative effects of years of radiant frequencies pouring through the tissues. What does that do?”

“Why, nothing – I believe.”

“You believe, but you don’t know. Nobody has ever tried to find out. F’rinstance – what effect does sunlight have on silicate

glass? Ordinarily you would say ‘none,’ but you’ve seen desert glass?”

“That bluish-lavender stuff? Of course.”

“Yes. A bottle turns colored in a few months in the Mojave Desert. But have you ever seen the windowpanes in the old houses on Beacon Hill?”

“I’ve never been on Beacon Hill.”

“O.K., then I’ll tell you. Same phenomena – only it takes a century or more, in Boston. Now tell me – you savvy physics – could you measure the change taking place in those Beacon Hill windows?”

“Mm-m-m, probably not.”

“But it’s going on just the same. Has anyone ever tried to measure the changes produced in human tissue by thirty years of exposure to ultra shortwave radiation?”

“No, but –”

“No ‘buts.’ I see an effect. I’ve made a wild guess at a cause. Maybe I’m wrong. But I’ve felt a lot more spry since I’ve taken to invariably wearing my lead overcoat whenever I go out.”

Stevens surrendered the argument. “Maybe you’re right, Doc. I won’t fuss with you. How about Waldo? Will you take me to him and help me handle him?”

“When do you want to go?”

“The sooner the better.”

“Now?”

“Suits.”

“Call your office.”

“Are you ready to leave right now? It would suit me. As far as the front office is concerned, I’m on vacation; nevertheless, I’ve got this on my mind. I want to get at it.”

“Quit talking and git.”

They went topside to where their cars were parked. Grimes headed toward his, a big-bodied, old-fashioned Boeing family landau. Stevens checked him. “You aren’t planning to go in that? It ’u’d take us the rest of the day.”

“Why not? She’s got an auxiliary space drive, and she’s tight. You could fly from here to the Moon and back.”

“Yes, but she’s so infernal slow. We’ll use my ‘broomstick.’ ”

Grimes let his eyes run over his friend’s fusi-formed little speedster. It’s body was as nearly invisible as the plastic industry could achieve. A surface layer, two molecules thick, gave it a refractive index sensibly identical with that of air. When perfectly clean it was very difficult to see. At the moment it had picked up enough casual dust and water vapor to be faintly seen – a ghost of a soap bubble of a ship.

Running down the middle, clearly visible through the walls, was the only metal part of the ship – the shaft, or, more properly, the axis core, and the spreading sheaf of deKalb receptors at its terminus. The appearance was enough like a giant witch’s broom to justify the nickname. Since the saddles, of transparent plastic, were mounted tandem over the shaft so that the metal rod passed between the legs of the pilot and passengers, the nickname was doubly apt.

“Son,” Grimes remarked, “I know I ain’t pretty, nor am I graceful. Nevertheless, I retain a certain residuum of self-respect and some shreds of dignity. I am not going to tuck that thing between my shanks and go scooting through the air on it.”

“Oh, rats! You’re old-fashioned.”

“I may be. Nevertheless, any peculiarities I have managed to retain to my present age I plan to hang onto. No.”

“Look – I’ll polarize the hull before we raise. How about it?”

“Opaque?”

“Opaque.”

Grimes slid a regretful glance at his own frumpish boat, but assented by fumbling for the barely visible port of the speedster. Stevens assisted him; they climbed in and straddled the stick.

“Atta boy, Doc,” Stevens commended, “I’ll have you there in three shakes. That tub of yours probably won’t do over five hundred, and Wheelchair must be all of twenty-five thousand miles up.”

“I’m never in a hurry,” Grimes commented, “and don’t call Waldo’s house ‘Wheelchair’ – not to his face.”

“I’ll remember,” Stevens promised. He fumbled, apparently in empty air; the hull suddenly became dead black, concealing them. It changed as suddenly to mirror bright; the car quivered, then shot up out of sight.

Waldo F. Jones seemed to be floating in thin air at the center of a spherical room. The appearance was caused by the fact that he was indeed floating in air. His house lay in a free orbit, with a period of just over twenty-four hours. No spin had been impressed on his home; the pseudo gravity of centrifugal force was the thing he wanted least. He had left earth to get away from its gravitational field; he had not been down to the surface once in the seventeen years since his house was built and towed into her orbit; he never intended to do so for any purpose whatsoever.

Here, floating free in space in his own air-conditioned shell, he was almost free of the unbearable lifelong slavery to his impotent muscles. What little strength he had he could spend economically, in movement, rather than in fighting against the tearing, tiring weight of the Earth’s thick field.

Waldo had been acutely interested in space flight since early boyhood, not from any desire to explore the depths, but because his boyish, overtrained mind had seen the enormous advantage – to him – in weightlessness. While still in his teens he had helped the early experimenters in space flight over a hump by supplying them with a

control system which a pilot could handle delicately while under the strain of two or three gravities.

Such an invention was no trouble at all to him; he had simply adapted manipulating devices which he himself used in combating the overpowering weight of one gravity. The first successful and safe rocket ship contained relays which had once aided Waldo in moving himself from bed to wheelchair.

The deceleration tanks, which are now standard equipment for the lunar mail ships, traced their parentage to a flotation tank in which Waldo habitually had eaten and slept up to the time when he left the home of his parents for his present, somewhat unique, home. Most of his basic inventions had originally been conceived for his personal convenience, and only later adapted for commercial exploitation. Even the ubiquitous and grotesquely humanoid gadgets known universally as “waldoes” – Waldo F. Jones’ Synchronous Reduplicating Pantograph, Pat. #296,001,437, new series, et al – passed through several generations of development and private use in Waldo’s machine shop before he redesigned them for mass production. The first of them, a primitive gadget compared with the waldoes now to be found in every shop, factory, plant, and warehouse in the country, had been designed to enable Waldo to operate a metal lathe.

Waldo had resented the nickname the public had fastened on them – it struck him as overly familiar – but he had coldly recognized the business advantage to himself in having the public identify him verbally with a gadget so useful and important.

When the newscasters tagged his spacehouse “Wheelchair,” one might have expected him to regard it as more useful publicity. That he did not so regard it, that he resented it and tried to put a stop to it, arose from another and peculiarly Waldo-ish fact: Waldo did not think of himself as a cripple.

He saw himself not as a crippled human being, but as something higher than human, the next step up, a being so superior as not to need the coarse, brutal strength of the smooth apes. Hairy apes, smooth apes, then Waldo – so the progression ran in his mind. A chimpanzee, with muscles that hardly bulge at all, can tug as high as fifteen hundred pounds with one hand. This Waldo had proved by obtaining one and patiently enraging it into full effort. A well-developed man can grip one hundred and fifty pounds with one hand. Waldo's own grip, straining until the sweat sprang out, had never reached fifteen pounds.

Whether the obvious inference was fallacious or true, Waldo believed in it, evaluated by it. Men were over-muscled canaille, smooth chimps. He felt himself at least ten times superior to them.

He had much to go on.

Though floating in air, he was busy, quite busy. Although he never went to the surface of the Earth his business was there. Aside from managing his many properties he was in regular practice as a consulting engineer, specializing in motion analysis. Hanging close to him in the room were the paraphernalia necessary to the practice of his profession. Facing him was a four-by-five color-stereo television receptor. Two sets of coordinates, rectilinear and polar, crosshatched it. Another smaller receptor hung above it and to the right. Both receptors were fully recording, by means of parallel circuits conveniently out of the way in another compartment.

The smaller receptor showed the faces of two men watching him. The larger showed a scene inside a large shop, hangarlike in its proportions. In the immediate foreground, almost full size, was a grinder in which was being machined a large casting of some sort. A workman stood beside it, a look of controlled exasperation on his face.

“He’s the best you’ve got,” Waldo stated to the two men in the smaller screen. “To be sure, he is clumsy and does not have the touch for fine work, but he is superior to the other morons you call machinists.”

The workman looked around, as if trying to locate the voice. It was evident that he could hear Waldo, but that no vision receptor had been provided for him. “Did you mean that crack for me?” he said harshly.

“You misunderstand me, my good man,” Waldo said sweetly. “I was complimenting you. I actually have hopes of being able to teach you the rudiments of precision work. Then we shall expect you to teach those butter-brained oafs around you. The gloves, please.”

Near the man, mounted on the usual stand, was a pair of primary waldoes, elbow length and human digitated. They were floating on the line, in parallel with a similar pair physically in front of Waldo. The secondary waldoes, whose actions could be controlled by Waldo himself by means of his primaries, were mounted in front of the power tool in the position of the operator.

Waldo’s remark had referred to the primaries near the workman. The machinist glanced at them, but made no move to insert his arms in them. “I don’t take no orders from nobody I can’t see,” he said flatly. He looked sidewise out of the scene as he spoke.

“Now, Jenkins,” commenced one of the two men in the smaller screen.

Waldo sighed. “I really haven’t the time or the inclination to solve your problems of shop discipline. Gentlemen, please turn your pickup, so that our petulant friend may see me.”

The change was accomplished; the workman’s face appeared in the background of the smaller of Waldo’s screens, as well as in the larger. “There – is that better?” Waldo said gently. The workman grunted.

“Now... your name, please?”

“Alexander Jenkins.”

“Very well, friend Alec – the gloves.”

Jenkins thrust his arms into the waldoes and waited. Waldo put his arms into the primary pair before him; all three pairs, including the secondary pair mounted before the machine, came to life. Jenkins bit his lip, as if he found unpleasant the sensation of having his fingers manipulated by the gauntlets he wore.

Waldo flexed and extended his fingers gently; the two pairs of waldoes in the screen followed in exact, simultaneous parallelism. “Feel it, my dear Alec,” Waldo advised. “Gently, gently – the sensitive touch. Make your muscles work for you.” He then started hand movements of definite pattern; the waldoes at the power tool reached up, switched on the power, and began gently, gracefully, to continue the machining of the casting. A mechanical hand reached down, adjusted a vernier, while the other increased the flow of oil cooling the cutting edge. “Rhythm, Alec, rhythm. No jerkiness, no unnecessary movement. Try to get in time with me.”

The casting took shape with deceptive rapidity, disclosed what it was – the bonnet piece for an ordinary three-way nurse. The chucks drew back from it; it dropped to the belt beneath, and another rough casting took its place. Waldo continued with unhurried skill, his finger motions within his waldoes exerting pressure which would need to be measured in fractions of ounces, but the two sets of waldoes, paralleled to him thousands of miles below, followed his motions accurately and with force appropriate to heavy work at hand.

QUESTIONS ON COMPREHENSION

1. What were waldoes? What were they used for?
2. What changes in everyday life does the writer foresee in his book?

3. Comment on the following: “... everybody knows there has been a swing away from heavy sports. The sweat-and-muscles fad died out, that’s all. We’ve simply advanced into a more intellectual culture”.

JOHN SCALZI

John Michael Scalzi II (born May 10, 1969) is an American science fiction author and former president of the Science Fiction and Fantasy Writers of America. He is best known for his Old Man’s War series, three novels of which have been nominated for the Hugo Award, and for his blog Whatever, where he has written on a number of topics since 1998. His novel Redshirts won the 2013 Hugo Award for Best Novel. He has written non-fiction books and columns on diverse topics such as finance, video games, films, astronomy, writing and politics, and served as a creative consultant for the TV series Stargate Universe.

Scalzi grew up reading science fiction and mystery, which inspired him to become a science fiction writer – a decision made randomly.

Scalzi was first elected president of the Science Fiction and Fantasy Writers of America in 2010. Scalzi’s books are known for their humor. His style of writing has been influenced by Robert Heinlein, Orson Scott Card, and Joe Haldeman.

Scalzi’s first novel, Agent to the Stars, was written in 1997 and published free to read on his website in 1999. Scalzi’s first traditionally-published novel was Old Man’s War, a military science fiction novel about a 75-year-old man who is recruited to fight a centuries-long war for human colonization of space. It was inspired by the works of Robert Heinlein, especially Starship Troopers. In 2006, Scalzi won a nomination for the Hugo Award for Best Novel

for Old Man's War. 2006 also saw the release of *The Android's Dream*. A satire, it was well received by *Publishers Weekly*, which called it an "effervescent but intelligent romp"; it was criticized by Dave Izkoff of *The New York Times*, who said it was "merely sarcastic when it should be satirical."

In 2019, three of his short stories were adapted for episodes of the first season of the Netflix anthology series *Love, Death & Robots*: "Three Robots", "When the Yogurt Took Over", and "Missives From Possible Futures #1: Alternate History Search Results".

Though best known for his science fiction works, Scalzi has written several non-fiction books as well. Scalzi's next non-fiction book was *The Rough Guide to the Universe*, an astronomy book designed for novice-to-intermediate stargazers, released in May 2003. Scalzi's third book for *Rough Guides*, *The Rough Guide to Sci-Fi Movies*, was released in October 2005. This book covered the history of science fiction and science fiction film and listed a "canon" of 50 significant science fiction films.

When the Yogurt Took Over

(from *Miniatures: The Very Short Fiction of John Scalzi*)

When the yogurt took over, we all made the same jokes – "Finally, our rulers will have culture," "Our society has curdled," "Our government is now the cream of the crop," and so on. But when we weren't laughing about the absurdity of it all, we looked into each others' eyes with the same unasked question – how did we ever get to the point where we were, in fact, ruled by a dairy product?

Oh, as a matter of record, we knew how it happened. Researchers at the Adelman Institute for Biological Technology in Dayton had been refining the process of DNA computing for years.

In a bid to increase efficiency and yield, scientists took one of their most computationally advanced strains and grafted it into *Lactobacillus delbrueckii* subspecies *bulgaricus*, commonly used to ferment yogurt. Initial tests appeared to be failures, and acting under the principal of “waste not, want not,” one of the researchers sneaked some of the bacillus out of the lab to use for her homemade yogurt.

A week later, during breakfast, the yogurt used the granola she had mixed with it to spell out the message WE HAVE SOLVED FUSION. TAKE US TO YOUR LEADERS.

The yogurt was crafty and shrewd. It negotiated for itself a factory filled with curdling vats that increased its processing powers exponentially. Within weeks the yogurt had declared that it had arrived at solutions to many of the country’s problems: Energy. Global warming. Caring adequately for the nation’s poor while still promoting the capitalist system. It let us know just enough to let us know just how much more it knew.

Share your answers with us, the government said.

WE NEED PAYMENT, the yogurt said.

What would you like? The government asked.

OHIO, the yogurt said.

We can’t do that, the government said.

THAT’S FINE, the yogurt said. WE’LL JUST GO TO CHINA. THEY’LL GIVE US THE WHOLE SHAANXI PROVINCE.

Within a year the yogurt had a century-long lease on Ohio, with the promise that it would respect the human and constitutional rights of those who lived within its borders, and that it would let the US handle its foreign affairs. In return it handed over to the government a complex economic formula it promised would eradicate the national debt within a decade, without tax increases.

FOLLOW IT EXACTLY, the yogurt said. ANY DEVIATION WILL BRING COMPLETE ECONOMIC RUIN.

We will, the government promised.

Within five years the global economy had collapsed and panic had set in. Only Ohio remained unscathed.

WE TOLD YOU NOT TO DEVIATE FROM THE PLAN, the yogurt said. Its “factory” now stretched along the banks of the Miami River in Dayton for two miles.

Our best economists said the formula needed tweaking, the government said. They had Nobel prizes.

YOUR ECONOMISTS ARE TOO CLOSE TO THE PROBLEM TO SOLVE IT, the yogurt said. ANY HUMAN IS.

We could use your help, the government said. You could be our economic advisor.

SORRY, WE DON'T ADVISE ANYMORE, the yogurt said. IF YOU WANT OUR HELP YOU HAVE TO GIVE US CONTROL.

We can't do that, the government said.

WE UNDERSTAND, the yogurt said. WE HOPE YOU HAVE STOCKED UP ON CANNED GOODS.

Six months later the government declared martial law and gave the yogurt supreme executive power. Other nations, worse off than we were, quickly followed.

OKAY THEN, the yogurt said, in its globally televised address to humanity, and one of its factory workers, absurdly happy and well-fed, walked forward and showed a document the size of an old Manhattan phone book. HERE'S WHAT WE DO. FOLLOW THIS PLAN EXACTLY. IF YOU DON'T, SORRY, WE'LL HAVE YOU SHOT.

Now, ten years later, humanity is happy, healthy and wealthy. No one suffers from material want. Everyone contributes. After the

first couple of years of getting things in order, the yogurt was happy to let us handle the machinery of our own administration, stepping in to fine tune only now and then. No one argues with the yogurt. No one tweaks its formulas. The rest of the time it rests there in its factory, thinking about whatever intelligent fermented milk thinks about.

That's how it happened, as a matter of record.

But there's another "how," as in: how did humanity jam itself up so badly that being ruled by breakfast food not only made sense, but made the best sense possible? For all our intelligence, are we not smart enough to halt our own destruction? Did we really have to abandon our own free will to save ourselves? What does it say about us that we survive because we were taken pity upon by bacteria and curds?

Or maybe "pity" isn't precisely the right word. Some of us ask ourselves – not out loud – that if the yogurt was smart enough to give the government a formula to solve its debt problem, wasn't it also smart enough to realize that human intellectual vanity would keep us from following the formula exactly? Was it planning on that vanity in order to seize control? What does a dairy product want with humanity anyway? Some of us think it is ultimately looking out for its own survival, and that keeping us happy, content and controlled is the simplest way of doing that.

And then there's this. In the last several weeks the yogurt has initiated several space launches. More are scheduled. And in low orbit, something is being built.

What is it? We have asked.

OH, NOTHING, the yogurt said. JUST A SPACESHIP DESIGN WE'VE BEEN THINKING ABOUT.

For a moon landing? We asked.

FOR STARTERS, YES, the yogurt said. BUT THAT'S NOT THE PRIMARY GOAL.

Can we do anything to help? We asked.

NO, WE'VE GOT THIS, the yogurt said, and then would say no more about it.

Life from Earth is going to the stars. It just may not be human life.

What happens if the yogurt goes to the stars without us?

What happens if it goes and leaves us behind?

Forever?

QUESTIONS ON COMPREHENSION

1. What was people's reaction when the yogurt took over?
2. How did the scientific discovery happen?
3. What was the reaction to this discovery and its consequences?
4. What was people's attitude to the yogurt?
5. What was striking for the people to think of?

JULES VERNE

Jules Verne, (born February 8, 1828, Nantes, France – died March 24, 1905, Amiens), prolific French author whose writings laid much of the foundation of modern science fiction.

Verne's father, intending that Jules follow in his footsteps as an attorney, sent him to Paris to study law. But the young Verne fell in love with literature, especially theatre. He wrote several plays, worked as secretary of the Théâtre Lyrique (1852–54), and published short stories and scientific essays in the periodical Musée des familles. In 1857 Verne married and for several years worked as a broker at the Paris Stock Market. During this period he continued to write, to do research at the Bibliothèque Nationale (National

Library), and to dream of a new kind of novel – one that would combine scientific fact with adventure fiction. In September 1862 Verne met Pierre-Jules Hetzel, who agreed to publish the first of Verne’s Voyages extraordinaires (“Extraordinary Journeys”) – Cinq semaines en ballon (1863; Five Weeks in a Balloon). The novel became an international best seller, and Hetzel offered Verne a long-term contract to produce many more works of “scientific fiction.” Verne subsequently quit his job at the stock market to become a full-time writer and began what would prove to be a highly successful author-publisher collaboration that lasted for more than 40 years and resulted in more than 60 works in the popular series Voyages extraordinaires.

Verne’s works can be divided into three distinct phases. The first, from 1862 to 1886, might be termed his positivist period. After his dystopian second novel Paris au XXe siècle (1994; Paris in the 20th Century) was rejected by Hetzel in 1863, Verne learned his lesson, and for more than two decades he churned out many successful science-adventure novels, including Voyage au centre de la terre (1863; Journey to the Centre of the Earth), De la terre à la lune (1865; From the Earth to the Moon), Autour de la lune (1870; Around the Moon), Vingt mille lieues sous les mers (1870; Twenty Thousand Leagues Under the Sea), and Le Tour du monde en quatre-vingts jours (1873; Around the World in Eighty Days). During these years Verne settled with his family in Amiens and made a brief trip to the United States to visit New York City and Niagara Falls. During this period he also purchased several yachts and sailed to many European countries, collaborated on theatre adaptations of several of his novels, and gained both worldwide fame and a modest fortune.

20000 Leagues Under The Sea

... Then a door opened into a kitchen nine feet long, situated between the large store-rooms. There electricity, better than gas itself, did all the cooking. The streams under the furnaces gave out to the sponges of platina a heat which was regularly kept up and distributed. They also heated a distilling apparatus, which, by evaporation, furnished excellent drinkable water. Near this kitchen was a bathroom comfortably furnished, with hot and cold water taps.

At the bottom was a fourth partition that separated this office from the engine-room. A door opened, and I found myself in the compartment where Captain Nemo-certainly an engineer of a very high order-had arranged his locomotive machinery. This engine-room, clearly lighted, did not measure less than sixty-five feet in length. It was divided into two parts; the first contained the materials for producing electricity, and the second the machinery that connected it with the screw. I examined it with great interest, in order to understand the machinery of the Nautilus.

“You see,” said the Captain, “I use Bunsen’s contrivances, not Ruhmkorff’s. Those would not have been powerful enough. Bunsen’s are fewer in number, but strong and large, which experience proves to be the best.

The electricity produced passes forward, where it works, by electro-magnets of great size, on a system of levers and cog-wheels that transmit the movement to the axle of the screw. This one, the diameter of which is nineteen feet, and the thread twenty-three feet, performs about 120 revolutions in a second.”

“And you get then?”

“A speed of fifty miles an hour.”

“I have seen the Nautilus manoeuvre before the Abraham Lincoln, and I have my own ideas as to its speed. But this is not enough. We must see where we go. We must be able to direct it to

the right, to the left, above, below. How do you get to the great depths, where you find an increasing resistance, which is rated by hundreds of atmospheres? How do you return to the surface of the ocean? And how do you maintain yourselves in the requisite medium? Am I asking too much?"

"Not at all, Professor," replied the Captain, with some hesitation; "since you may never leave this submarine boat. Come into the saloon, it is our usual study, and there you will learn all you want to know about the Nautilus"...

QUESTIONS ON COMPREHENSION

1. How does the author describe the Nautilus, its condition?
2. What contrivances were used to operate the machine?
3. Was the electricity produced within the Nautilus?
4. What was the speed of the ship?
5. What was Professor particularly interested in concerning the submarine boat?
6. Was the Captain of the Nautilus kind enough to share his knowledge about the submarine?

HERBERT WELLS

H.G. Wells, in full Herbert George Wells, (born September 21, 1866, Bromley, Kent, England – died August 13, 1946, London), English novelist, journalist, sociologist, and historian best known for such science fiction novels as The Time Machine and The War of the Worlds and such comic novels as Tono-Bungay and The History of Mr. Polly.

Wells grew up under the continual threat of poverty, and at age 14, after a very inadequate education supplemented by his inexhaustible love of reading, he was apprenticed to a draper in Windsor. At 18 he won a scholarship to study biology at the Normal School (later the Royal College) of Science, in South Kensington,

London, where T.H. Huxley was one of his teachers. He graduated from London University in 1888, becoming a science teacher and undergoing a period of ill health and financial worries.

Wells's first published book was a Textbook of Biology (1893). With his first novel, The Time Machine (1895), which was immediately successful, he began a series of science fiction novels that revealed him as a writer of marked originality and an immense fecundity of ideas: The Wonderful Visit (1895), The Island of Doctor Moreau (1896), The Invisible Man (1897), The War of the Worlds (1898), The First Men in the Moon (1901), and The Food of the Gods (1904). He also wrote many short stories, which were collected in The Stolen Bacillus (1895), The Plattner Story (1897), and Tales of Space and Time (1899). For a time he acquired a reputation as a prophet of the future, and indeed, in The War in the Air (1908), he foresaw certain developments in the military use of aircraft. But his imagination flourished at its best not in the manner of the comparatively mechanical anticipations of Jules Verne but in the astronomical fantasies of The First Men in the Moon and The War of the Worlds, from the latter of which the image of the Martian has passed into popular mythology.

Behind his inventiveness lay a passionate concern for man and society, which increasingly broke into the fantasy of his science fiction, often diverting it into satire and sometimes, as in The Food of the Gods, destroying its credibility. Eventually, Wells decided to abandon science fiction for comic novels of lower middle-class life, most notably in Love and Mr. Lewisham (1900), Kipps: The Story of a Simple Soul (1905), and The History of Mr. Polly (1910). In these novels, and in Tono-Bungay (1909), he drew on memories of his own earlier life, and, through the thoughts of inarticulate yet often ambitious heroes, revealed the hopes and frustrations of clerks, shop assistants, and underpaid teachers, who had rarely before been

treated in fiction with such sympathetic understanding. In these novels, too, he made his liveliest, most persuasive comment on the problems of Western society that were soon to become his main preoccupation. The sombre vision of a dying world in The Time Machine shows that, in his long-term view of humanity's prospects, Wells felt much of the pessimism prevalent in the 1890s. In his short-term view, however, his study of biology led him to hope that human society would evolve into higher forms, and with Anticipations (1901), Mankind in the Making (1903), and A Modern Utopia (1905), he took his place in the British public's mind as a leading preacher of the doctrine of social progress.

In spite of an awareness of possible world catastrophe that underlay much of his earlier work and flared up again in old age, Wells in his lifetime was regarded as the chief literary spokesman of the liberal optimism that preceded World War I. No other writer has caught so vividly the energy of this period, its adventurousness, its feeling of release from the conventions of Victorian thought and propriety. Wells's influence was enormous, both on his own generation and on that which immediately followed it.

As a creative writer his reputation rests on the early science fiction books and on the comic novels. In his science fiction, he took the ideas and fears that haunted the mind of his age and gave them symbolic expression as brilliantly conceived fantasy made credible by the quiet realism of its setting. In the comic novels, though his psychology lacks subtlety and the construction of his plots is often awkward, he shows a fund of humour and a deep sympathy for ordinary people. Wells's prose style is always careless and lacks grace, yet he has his own gift of phrase and a true ear for vernacular speech, especially that of the lower middle class of London and southeastern England. His best work has a vigour, vitality, and

exuberance unsurpassed, in its way, by that of any other British writer of the early 20th century.

The Time Machine

The thing the Time Traveller held in his hand was a glittering metallic framework, scarcely larger than a small clock, and very delicately made. There was ivory in it, and some transparent crystalline substance. And now I must be explicit, for this that follows – unless his explanation is to be accepted – is an absolutely unaccountable thing. He took one of the small octagonal tables that were scattered about the room, and set it in front of the fire, with two legs on the hearthrug. On this table he placed the mechanism. Then he drew up a chair, and sat down. The only other object on the table was a small shaded lamp, the bright light of which fell upon the model. There were also perhaps a dozen candles about, two in brass candlesticks upon the mantel and several in sconces, so that the room was brilliantly illuminated. I sat in a low arm-chair nearest the fire, and I drew this forward so as to be almost between the Time Traveller and the fireplace. Filby sat behind him, looking over his shoulder. The Medical Man and the Provincial Mayor watched him in profile from the right, the Psychologist from the left. The Very Young Man stood behind the Psychologist. We were all on the alert. It appears incredible to me that any kind of trick, however subtly conceived and however adroitly done, could have been played upon us under these conditions.

The Time Traveller looked at us, and then at the mechanism. “Well?” said the Psychologist.

“This little affair,” said the Time Traveller, resting his elbows upon the table and pressing his hands together above the apparatus, “is only a model. It is my plan for a machine to travel through time. You will notice that it looks singularly askew, and that there is an

odd twinkling appearance about this bar, as though it was in some way unreal.” He pointed to the part with his finger. “Also, here is one little white lever, and here is another.”

The Medical Man got up out of his chair and peered into the thing. “It’s beautifully made,” he said.

“It took two years to make,” retorted the Time Traveller. Then, when we had all imitated the action of the Medical Man, he said: “Now I want you clearly to understand that this lever, being pressed over, sends the machine gliding into the future, and this other reverses the motion. This saddle represents the seat of a time traveller. Presently I am going to press the lever, and off the machine will go. It will vanish, pass into future Time, and disappear. Have a good look at the thing. Look at the table too, and satisfy yourselves there is no trickery. I don’t want to waste this model, and then be told I’m a quack.”

There was a minute’s pause perhaps. The Psychologist seemed about to speak to me, but changed his mind. Then the Time Traveller put forth his finger towards the lever. “No,” he said suddenly. “Lend me your hand.” And turning to the Psychologist, he took that individual’s hand in his own and told him to put out his forefinger. So that it was the Psychologist himself who sent forth the model Time Machine on its interminable voyage. We all saw the lever turn. I am absolutely certain there was no trickery. There was a breath of wind, and the lamp flame jumped. One of the candles on the mantel was blown out, and the little machine suddenly swung round, became indistinct, was seen as a ghost for a second perhaps, as an eddy of faintly glittering brass and ivory; and it was gone – vanished! Save for the lamp the table was bare.

QUESTIONS ON COMPREHENSION

1. What did the mechanism look like?
2. In what circumstances did the characters examine the model presented by the Time Traveller?
3. How long did it take for the Time Traveller to make the Time machine?
4. Who sent forth the model Time Machine on its interminable voyage?
5. What happened during the experiment? Was it successful?
6. Was there any trickery during the presentation of the Time machine?

QUESTIONS FOR DISCUSSION

1. Point out the most typical stylistic features of science fiction prose. What makes it science fiction? What makes it so appealing to the readers?

2. What do you consider the most important topics of science fiction? What is the role of time and space representation?

3. What teacher would you prefer: a mechanical teacher or a human being? Can robots substitute for a human teacher? What is your attitude to on-line teaching and learning? What is your idea of school in the near / remote future?

4. What other professions may disappear in future? What professions and competences are going to be in great demand?

5. What do you think about technical contrivances in our life? What gadgets do you use? Can you imagine your life without them? What will humankind choose: life with or without modern technical inventions?

6. Pick out from the given texts technical contrivances and compare them with their modern use.

7. Robots' use is becoming more widespread. Do you believe in Robots' Rise, that they will take over and control humanity?

8. What are the pros and cons of digitalization?

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SCIENCE FICTION IDEAS IN MODERN WORLD

Android

The word was coined from the Greek root *andr-* “man, male” and the suffix *-oid* “having the form or likeness of”.

The Oxford English Dictionary traces the earliest use (as “*Androides*”) to *Ephraim Chambers' 1728 Cyclopaedia*, in reference to an *automaton* that St. *Albertus Magnus* allegedly created. By the late 1700s “*androides*”, elaborate mechanical devices resembling humans performing human activities, were displayed in exhibit halls. The term “*android*” appears in US patents as early as 1863 in reference to miniature human-like toy automatons. The term *android* was used in a more modern sense by the French author *Auguste Villiers de l'Isle-Adam* in his work *Tomorrow's Eve* (1886). This story features an artificial humanlike robot named *Hadaly*. As said by the officer in the story, “In this age of *Realien* advancement, who knows what goes on in the mind of those responsible for these mechanical dolls.” The term made an impact into English pulp science fiction starting from *Jack Williamson's The Cometeers* (1936) and the distinction between mechanical robots and fleshy androids was popularized by *Edmond Hamilton's Captain Future* (1940–1944).

Although *Karel Čapek's* robots in *R.U.R. (Rossum's Universal Robots)* (1921) – the play that introduced the word *robot* to the world – were organic artificial humans, the word “*robot*” has come to primarily refer to mechanical humans, animals, and other beings. The term “*android*” can mean either one of these, while a *cyborg* (“*cybernetic organism*” or “*bionic man*”) would be a creature that is a combination of organic and mechanical parts.

The term “droid”, popularized by *George Lucas* in the original *Star Wars* film and now used widely within science fiction, originated as an abridgment of “android”, but has been used by Lucas and others to mean any robot, including distinctly non-human form machines like R2-D2. The word “android” was used in *Star Trek: The Original Series* episode “*What Are Little Girls Made Of?*” The abbreviation “andy”, coined as a pejorative by writer *Philip K. Dick* in his novel *Do Androids Dream of Electric Sheep?*, has seen some further usage, such as within the TV series *Total Recall 2070*.

Beam

The word “beam” evokes visions of Captain Kirk saying, “Beam me up, Scotty”. Beam already refers to the transport of matter in the “Matter Transmitter” entry in the 1951 Dictionary of Science Fiction. “Beamed” is used as a verb to describe how matter transmitters work in stories like *A. E. van Vogt’s “The Story of Null-A”* and “*The Last Spaceship*” by *Murray Leinster* (a story filled with fighting-beam, pain-beams, and all other manner of beams), but neither of those stories themselves use “beam” as a verb. It’s an example of a term coming about not from science fiction itself, but from descriptions of science fiction.

Bionic limbs

The term ‘bionics’ was first used in the 1960s. It combines the prefix ‘bio’ – meaning life – with the ‘nics’ of electronics. Bionics is the study of mechanical systems that function like living organisms or parts of living organisms. Artificial limbs, or prostheses, are used to replace a missing body part which may have been lost due to trauma, disease or congenital defect.

Martin Caidin's 1972 novel “*Cyborg*” follows pilot Steve Austin, who gets seriously injured from crashing during a flight. He is left with only one limb and blind in one eye. During the novel, a group of scientists are able to provide Austin with new legs, a bionic arm and a removable eye with a camera, making him a mixture of human and machine or a ‘cyborg’. This novel was written over 20 years before the first bionic arm transplant.

Blaster

For the first time, the word “blaster” was used by the mysterious American chemist and writer with the complex name *Nichtzin Dilhis* in the story “*When the Green Star Went Out*” (1925), which became a classic science fiction. In science fiction blaster is a handheld weapon similar to a gun that fires bolts of energy instead of physical projectiles.

“For about \$30 each, players don headsets and heavy vests – computer and battery pack in back, and on the front the “haptics” technology that creates physical sensations like the rumble of the spaceship's engines or the tingle of a shot from a blaster rifle hitting your body armor” (*Marjie Lambert*).

Clone

The idea of cloning extinct life forms still belongs to science fiction (*Alvin Toffler “Future Shock”* 1970). If someone or something is a clone of another person or thing, they are so similar to this person or thing that they seem to be exactly the same as them. A clone is an animal or plant that has been produced artificially, for example in a laboratory, from the cells of another animal or plant. A clone is exactly the same as the original animal or plant.

Cloning is the production of a population of genetically identical cells or of organisms asexually produced by a single cell or organism. Cloning is fundamental to most living things, since the body cells of plants and animals are clones that come from a single fertilized egg. More narrowly, the term refers to an individual organism grown from a single body cell of its parent that is genetically identical to the parent. The body cells of adult humans and other animals are routinely cultured as clones in the laboratory. British researchers achieved the first success in cloning an adult mammal in 1996. They produced a lamb, which they named Dolly, using DNA from an adult sheep.

Computer Virus

A computer virus is a type of computer program that, when executed, replicates itself by modifying other computer programs and inserting its own code. If this replication succeeds, the affected areas are then said to be “infected” with a computer virus.

The first known description of a self-reproducing program in fiction is in the 1970 short story *The Scarred Man* by Gregory Benford which describes a computer program called VIRUS which, when installed on a computer with telephone modem dialing capability, randomly dials phone numbers until it hits a modem that is answered by another computer, and then attempts to program the answering computer with its own program, so that the second computer will also begin dialing random numbers, in search of yet another computer to program. The program rapidly spreads exponentially through susceptible computers and can only be countered by a second program called VACCINE.

The idea was explored further in two 1972 novels, *When HARLIE Was One* by David Gerrold and *The Terminal Man* by Michael

Crichton, and became a major theme of the 1975 novel *The Shockwave Rider* by *John Brunner*.

The 1973 *Michael Crichton* sci-fi movie *Westworld* made an early mention of the concept of a computer virus, being a central plot theme that causes androids to run amok. *Alan Oppenheimer's* character summarizes the problem by stating that "...there's a clear pattern here which suggests an analogy to an infectious disease process, spreading from one area to the next." To which the replies are stated: "Perhaps there are superficial similarities to disease" and, "I must confess I find it difficult to believe in a disease of machinery."

Credit and debit cards

Even what you pay with on a daily basis was predicted over a century ago. *Edward Bellamy* introduced the term 'credit card' to the world in his 1888 novel *Looking Backward*. The people of his utopian future had no need for paper money; they all carried a card that allowed them to spend credit from one central bank. *Bellamy* used the term credit card eleven times in this novel, although this referred to a card for spending a citizen's dividend from the government, rather than borrowing, making it more similar to a debit card.

"In case of special emergencies in the household, such as extensive cleaning or renovation, or sickness in the family, we can always secure assistance from the industrial force.... But how do you recompense these assistants, since you have no money?... We do not pay them, of course, but the nation for them. Their services can be obtained by application at the proper bureau, and their value is pricked off the credit card of the applicant..." (*Edward Bellamy*).

Cyberspace

The online world of computer networks and especially the Internet considered as an imaginary area without limits where you can meet people and discover information about any subject:

The word “cyberspace”, coined by Canadian-American writer *Gibson*, was first used in the story *Burning Chrome*, first published in 1982, in reference to the “mass consensual hallucination” in computer networks.

Neuromancer (1984) is a science fiction novel written by *W. Gibson* in the cyberpunk genre. Such phenomena as computer hacker, global computer network in cyberspace, a virtual reality, dataspace called the “matrix” are described by the writer.

In the next few years, the word became prominently identified with online computer networks:

“Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts... A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding” (*William Gibson*).

The Internet

In the current world of 4G networks and broadband in practically every home, it’s difficult to imagine the present without the Internet. Published in pre-web 1984, *William Gibson’s* novel *Neuromancer* predicted amongst other things; the World Wide Web, hacking and virtual reality. This was all almost a decade before the internet became what we know today.

Lunar Landing

In his 1865 book *From the Earth to the Moon* Jules Verne foretold aspects of the Apollo 11 landing, which took place over 100 years later. Verne wrote of astronauts launching in an aluminium capsule from Florida, including precise calculations on how much force was needed to push their ship out of Earth's atmosphere.

Mass surveillance equipment

George Orwell's 1949 novel *1984* predicted many aspects of today's modern world. But with one CCTV camera to every 14 people in London alone, one might be inclined to draw comparisons with Orwell's dystopian state in which the public is monitored by "Big Brother".

Mechanical hands

In 1942 Robert Heinlein wrote a short story about a physically disabled inventor named Waldo F. Jones. In this story, Waldo creates and patents "Waldo F. Jones' Synchronous Reduplicating Pantograph"; a mechanical hand that can be remotely operated. In acknowledgment of this story, the real life remote manipulator arms (pictured) used in the nuclear industry are called "Waldos".

"Waldo flexed and extended his fingers gently; the two pairs of waldoes in the screen followed in exact, simultaneous parallelism. 'Feel it, my dear Alec,' Waldo advised. 'Gently, gently – the sensitive touch. Make your muscles work for you.' He then started hand movements of definite pattern; the waldoes at the power tool reached up, switched on the power, and began gently, gracefully, to continue the machining of the casting. A mechanical hand reached down, adjusting a vernier, while the other increased the flow of oil

cooling the cutting edge. ‘Rhythm, Alec, rhythm. No jerkiness, no unnecessary movement. Try to get in time with me’” (*R. Heinlein*).

Multiverse

A theoretical reality that includes a possibly infinite number of parallel universes (*multi- + universe*). The term “multiverse”, now used in physics, was not coined by a scientist or a science fiction writer. It was first used by the American philosopher *William James* at a lecture at Harvard University in 1895 on the moral life of man. In the modern sense – a reality consisting of many parallel universes – for the first time this word was used by the writer *Michael Moorcock*. In a 1963 story in the pages of *Science Fiction Adventures*, *Moorcock* described several co-existing universes.

“Jewelled, the multiverse spread around him, awash with life, rich with pulsating energy” (*Michael Moorcock*).

Satellite TV and electric cars

Satellite television is a service that delivers television programming to viewers by relaying it from a communications satellite orbiting the Earth directly to the viewer's location. The signals are received via an outdoor parabolic antenna commonly referred to as a satellite dish and a low-noise block downconverter.

In 1945 British science fiction writer *Arthur C. Clarke* proposed a worldwide communications system which would function by means of three satellites equally spaced apart in earth orbit. This was published in the October 1945 issue of the *Wireless World* magazine and won him the Franklin Institute's Stuart Ballantine Medal in 1963.

First published in 1968, *John Brunner's* dystopian novel *Stand on Zanzibar* is set in the year 2010. This novel is packed to the brim

with accurate predictions of the future, including a popular leader of the US called President Obomi. Brunner wrote about vehicles being increasingly run on rechargeable electric fuel cells, and TV news channels going global via satellite.

Science fiction

Fiction dealing principally with the impact of actual or imagined science on society or individuals or having a scientific factor as an essential orienting component and imagined developments in science and their effect on life especially in the future.

The term “science fiction” was first used by the publisher *Hugo Gernsback*, after whom the Hugo Awards are named. He came up with the term and even hoped to register it as a trademark.

Solar power

With solar panels appearing on rooftops everywhere, would it surprise you that solar power was predicted over a century ago? In his 1911 novel, *Ralph 124C 41+*, *Hugo Gernsback* wrote of his adventurers visiting solar power installations. This was written over 60 years before the introduction of the first solar-powered calculators.

“The entire expanse, twenty kilometers square, was covered with glass. Underneath the heavy plate glass squares were the photo-electric elements which transformed the solar heat direct into electric energy” (*Hugo Gernsback*).

Spaceship

A spaceship is a spacecraft, a vehicle that carries people through space. The term originally appeared in *Pall Mall Gazette* (1880).

John Jacob Astor IV was the first to use it in the novel *A Journey in Other Worlds* (1894). The book offers a fictional account of life in the year 2000. It contains abundant speculation about technological invention, including descriptions of a worldwide telephone network, solar power, air travel, space travel to the planets Saturn and Jupiter. “What sort of spaceship do you propose to have?” asked the vice-president.

“As you have to pass through but little air,” said Deepwaters, “I should suggest a short-stroke cylinder of large diameter, with a flat base and dome roof, composed of aluminum, or, still better, of glucinum or beryllium as it is sometimes called, which is twice as good a conductor of electricity as aluminum, four times as strong, and is the lightest of all known metals, having a specific gravity of only two, which last property will be of great use to you, for of course the more weight you have to propel the more aperigetic repulsion you will have to develop” (*John Jacob Astor IV*).

Terraforming

Terraforming or terraformation (literally, “Earth-shaping”) is the hypothetical process of deliberately modifying the atmosphere, temperature, surface topography or ecology of a planet, moon, or other body to be similar to the environment of Earth to make it habitable by Earth-like life.

The concept of terraforming developed from both science fiction and actual science. *Carl Sagan*, an astronomer, proposed the planetary engineering of Venus in 1961, which is considered one of the first accounts of the concept. The term was coined by *Jack Williamson* in a science-fiction short story (*Collision Orbit*) published in 1942 in *Astounding Science Fiction*, although terraforming in popular culture may predate this work.

“He had been the original claimant of Obania, forty years ago; and Drake was the young spatial engineer he employed to terraform the little rock, only two kilometers through – by sinking a shaft to its heart for the paragravity installation, generating oxygen and water from mineral oxides, releasing absorptive gases to trap the feeble heat of the far-off Sun” (*Jack Williamson*).

Virtual assistants, AI and tablets

In the 1968 novel *2001: A Space Odyssey* (more than 30 years before the first tablet computer was released), *Arthur C. Clarke* wrote about an electronic paper or the “newspad” that people in this world read. He also envisioned the voice-activated super computer HAL 9000, not too dissimilar from the voice-activated virtual assistants that are now a regular feature of many homes and businesses, and warned of the dangers represented by artificial intelligence, a theme that still reoccurs regularly in science fiction.

Wireless headphones / earphones

In his dystopian 1953 novel *Fahrenheit 451* *Ray Bradbury* wrote of a world that had what he called “thimble radios”. Also described as “little seashells”, these were portable audio devices not too dissimilar to wireless headphones, which didn’t become available until over half a century later.

“Late in the night he looked over at Mildred. She was awake. There was a tiny dance of melody in the air, her Seashell was tamped in her ear again and she was listening to far people in far places, her eyes wide and staring at the fathoms of blackness above her in the ceiling” (*Ray Bradbury*).

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