

**Consciousness Explained
(1992)
Daniel C. Dennett**

1. Prelude: How are Hallucinations possible?

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2. Explaining Consciousness.

Consciousness is one of the last frontiers of science where we do not even know how to think about the problem yet. Some will resist its demystification for fear of losing the childhood innocence of love and honour.

The mystery is that our physical bodies are conscious of internal and external happenings and take pleasure in it.

The conscious mind cannot be the brain because nothing in the brain could 1) be the medium in which a purple cow is rendered 2) be the thinking thing, as I in "I think therefore I am" 3) appreciate wine, hate racism, love somebody 4) act with moral responsibility.

Dualism is forlorn because there is no explanation for how the mind directs a physical brain - conservation of energy is violated.

Dennett's treatment will not allow wonder tissue, will not feign anaesthesia and will not nit-pick empirical details.

Chapter 3. A Visit to the Phenomenological Garden

Three aspects of phenomena: experiences of the external world, experiences of the internal world and experiences of emotion.

External: taste and smell are very low resolution and non-descript. Touch is more describable but consider that you can feel a slippery road when driving. Sound has specific features and difficult to explain similarities between A's or between notes played on a guitar. Consider a proposal 200 years ago to create a music replication device and the difficulty of fitting all of the necessary instruments in the device. A CD player makes this look easy, but what happens when the sound enters the head? Also spoken words are not separated by quiet gaps but by something else. The visual field is only high resolution in the centre 2-3 degrees but we do not normally experience this. Consider how difficult it is

to draw despite having sufficient dexterity and the object of the drawing in clear view. Also, the conversion from a 2-D picture to 3-D impression is effortless.

Internal: the phenomenology of comprehension is quasi-visual (a fact ignored by AI). Different people visualise a concept according to their own precepts. There are mental images but not in the literal sense. Imagined sensations are valuable but not as vivid as the real thing. Much of pleasure and pain is tied up in recollection and anticipation.

Affect: Imagined pain is not the same as real pain. Any purely mechanical explanation of pain or laughter would be inadequate in leaving out the essential awfulness and hilarity respectively. However, to include them would make the description circular.

Chapter 4. A Method for phenomenology.

"...when we claim to be just using our powers of inner observation, we are always actually engaging in a sort of impromptu theorising - and we are remarkably gullible theorists, precisely because there is so little to "observe" and so much to pontificate about without fear of contradiction." pg 68
The third person perspective is the appropriate stance for investigation.

Hetero-phenomenology as a method. People are the only subject of scientific study where the subject is prepared by verbal communication. Take the recording of the study and have it transcribed (interpreted) by three independent stenographers. This requires the adoption of the intentional stance: that the subject is a rational agent who harbours beliefs and desires.

Treat the transcripts as works of fiction such that their content is taken as true representations of the subject's world. (ie separate the what for the how). A fiction can be interpreted and we can learn from it. This method has the advantage that conclusions about the subject's hetero-phenomenal world can be analysed while delaying its relationship with reality until later.

An anthropologist simply records and categorises the beliefs of a community without passing judgement on the applicability of those beliefs to the real world.

If we could discover what people were really talking about, and could compare it with their hetero-phenomenal version of it then we could determine if they were deluded or not.

A computer robot can interpret a scene via an algorithmic process but is it image processing or binary processing. What level of access could it have to its own process?

The neutrality of hetro-phenomenology allows the subject to have absolute authority over what they believe they feel.

Chapter 5. Multiple Drafts vs. Cartesian Theatre.

Once dualism is discarded the Cartesian model remains.

The Multiple Drafts Model sees each feature of perception discriminated only once in the specialised localised position of the brain (not an additional time in a central theatre). We are not conscious of our eyes moving 5 times per sec or the head movements. The phi phenomenon, where closely presented images appear to move, sees a red dot turn to blue at the midpoint between the actual location of the dots. This post-editing of perception prior to conscious is the multiple-drafts answer.

A Stalinesque approach would have experience altered before being passed to consciousness and memory. An Orwellian approach would have memories adjusted after the fact. Both rely on the Cartesian theatre and cannot be distinguished from each other by either subject or experimenter.

The brain does not go back and revised perception for the period between the dots for there is no Cartesian theatre in which to review it. Rather, the perception of the green dot arrives, the brain adds this to the earlier perception of the red dot and then concludes that the dot moved and changed colour, and then the brain moves forward with this conclusion. If queried where the dot changed colour the brain constructs a theory of where it happened in retrospect. There is no primary version of what happened to be corrupted, just a rolling estimation.

A person reporting a sequence of events did not necessarily come by the information in a chronological sequence.

Unconscious driving is better thought of as rolling consciousness with swift memory loss (at any point along the drive you can report what is going on around you (i.e. you are not unconscious at the time). Consider also that you can notice a background noise stop that you were not conscious of (then how did you notice it stop?). You can often count the number of clock chimes after they are already under-way.

Chapter 6. Time and Experience

Additional experimental results examined include showing many letters in rapid succession (and being able to count them but not report them) meta contrast where only a second stimuli is reported but the subject can guess that there were two., and the cutaneous rabbit where sequential taps on the wrist, elbow and shoulder are reported as equidistant steps up the arm.

"The brains task is to guide the body it controls through a world of shifting conditions and sudden surprises, so it must gather information from that world and use it swiftly to Extract anticipations in order to stay one step ahead of disaster.

Films run at 24 fps, therefore the visual system can resolve order between stimuli that occur between about 50ms. So the temporal properties of signals must be accurately controlled until discrimination are made.

Synchronisation can be done at a low level (as for syncing a film visuals with audio).

Libet conducted experiments where a electric stimulation was applied to the hand and to the corresponding point on the cortex. If the stimulus (left hand / left cortex) were presented simultaneously then the one on the hand was reported by the subject as occurring first. Much of the academic discussion has been Orwellian vs Stalinist and does not consider the possibility that the experience does not occur at a specific point in time.

Libet's follow up experiments had "normal" subjects clench their fist and later report the time that they decided on the action. "readiness potentials" were recorded with scalp electrodes 350-400ms prior to the time reported as the decision to act. The academic discussion of these results touched on the difference between the sequential timing of events and the representation of the sequential timing of the events (which is all that matters).

Walter Grey implanted electrodes in the subjects skull and asked the subject to watch a slide show which they progressed by themselves with an advance button. However, the slides were actually advanced by the amplified signal from the electrodes and the subjects expressed surprise that the slide appeared to advance just before they made the decision to advance the slide but before they could veto it. By Dennett's interpretation, the subjects response was the best interpretation that the brain

could make of an external action that seemed to happen earlier than expectation.

"exactly when did the British Empire become informed of the truce in the War of 1812? Sometime between 24-12-1814 and 15-01-1816.

Chapter 7. The Evolution of Consciousness.

The birth of boundaries and reason. The organism must recognise the distinction between good, bad and neutral and must become selfish (define its boundaries and defend that within). The recognition is by blind mechanical process. Elements often play multiple functions in nature as new capabilities are cobbled together from existing systems.

The sea squirt has a rudimentary nervous system used to find and attach to a suitable home for life. It then eats its brain! (like getting tenure)

In the beginning all signals from the environment meant scam or go for it!.

First there was proximal anticipation (good or bad via touch) then short range anticipation (the duck response is hard wired to looming object).

"...they trade off what might be called truth and accuracy in reporting for speed and economy" pg 179.

Becoming reliably informed that another animal is looking oriented) towards you is a very important survival capability (being eaten or reproductive opportunity)

The orienting response is when the organism responds to a stimuli by stopping what it is doing and doing a quick scan or update from every sense organ. If this triggers an alarm (something interesting) then the next level of analysis/action is taken.

This regular vigilance evolved into regular exploration to acquire information for its own sake. (consider saccades - rapid eye movements)

These basic mechanisms of withdraw or approach were not broken but added to.

Marcel Kinsbourne theorises the segmentation of the brain into dorsal (basic keeping out of harms way) and ventral (analysing particulars in serial fashion) part which evolved into the right and left hemisphere respectively.

The Baldwin effect is where inbuilt plasticity allows

otherwise hard-wired organisms to benefit from small adjustments to nearby advantages. These adjustments are not passed on to offspring but through the success of the parent, produce more offspring with the parents nearly advantageous genetics with a higher probability of a incremental mutation to that advantageous DNA. This has the effect of making a specific isolated "needle in a haystack" DNA more findable.

The famous four F's (fight flee feed or mate)

With all thinking systems on-line all the time, without a central coordinator, (but other than refer to pandemonium, Dennett gave no answer to this problem.)

The increase in the size and structure of the primate brain was complete before language was developed.

To go beyond this organism with vigilance, novel seeking and short attention span a capacity to represent the environment was needed to move forward.

Language may have begun as simple vocabulary to communicate basic and then requests for help. Then a primate requesting help could answer their own question via the external loop which would then allow the internal loop to develop and inner speech as a next step. This auto-stimulation can extend to drawings.

Richard Dawkins introduced the concept of memes as ideas which are symbiotic parasites on the human mind (by both riding within and developing) which obey many of the genetic evolutionary laws (continuing abundance of variation, capacity to replicate and differential fitness).

"A scholar is just a libraries way of making another library".

A memes survival is dependent on brute physical replication of vehicles. Some memes like *faith* disable the critical evaluation which would destroy it (also conspiracy theory). Faith (and the religious memes riding piggyback) also flourish in a rational environment and diminish in the absence of sceptics. The *education* meme enhances the replication process of other memes.

Genetic evolution, phenotype plasticity (the Baldwin effect) and memic evolution (culture) have all contributed to the rapid development of human consciousness.

Hypothesis: "Human consciousness is itself a huge complex of memes (or more exactly meme-effects

on the brain) that can best be understood as the operation of a 'von Neumannesque' virtual machine implemented in the parallel architecture of a brain that was not designed for any such activities. The powers of this virtual machine vastly enhance the underlying powers of the organic hardware on which it runs, but at the same time many of the most curious features, and especially its limitations, can be explained as the by products of the kludges that make possible this curious but effective reuse of an existing organ for novel purposes." pg 210

The von Neumann machine can (in theory) simulate a parallel brain (ignoring time constraints) but a parallel brain can also (in theory) simulate an von Neuman machine.

This hypotheses attempts to show that Consciousness 1. is too recent to be hard-wired 2. is a product of cultural evolution imparted during early training 3. Is installed as a myriad of micro-settings (and will remain opaque to neuro-science as a result) 4. The idea of a ser is tantalising but wrong.

This shared Joycean machine installed in the memosphere must have a high degree of lability and format tolerance. It is shared by communication, reinforcement (reward, approval, threat etc).

This virtual machine can only exist in an environment which has language, social interaction, writing and diagramming (demands on memory and pattern recognition need to be offloaded into buffers in the environment).

The overall structure of this set of regularities is serial chaining (as supported by mechanisms such as talking to ones self)

One "cannot easily or ordinarily maintain uninterrupted attention on a single problem for more than a few tens of seconds but we do so by periods of mulling followed by periods of recapitulation, describing to ourselves what seems to have gone on during mulling, leading to whatever intermediate results we have reached." pg 224 Margolis 1987.

The brain does not have super-reliable fast, random access memory but it has developed tricks like rehearsal, external storage (and perhaps even head-scratching) to help.

"we should not expect most of the sequences that occurred to be well proven algorithms, guaranteed to yield the sought after results, but just better than chance forays into Plato's avery.

Chapter 8. How Words do Things With Us.

This Chapter seeks a replacement for the central meaner - the bureaucratic vs pandemonium models - where does the meaning come from before it is spoken.

In the pandemonium model an utterance might start with gibberish and progressively be developed into something useful. But how is something judged as useful? Perhaps there are a pandemonium of questioners and answerers and these opposing groups settle on a result. (reference here to Sperber and Wilson)

Slips of the tongue and spoonerisms are interesting. Also intention is not transferred with speech but rather speech is interpreted by the receiver within their own context - and the transfer is often poor.

E.M.Foster "How do I know what I think until I hear what I say?"

The meaning is actually developed as the settling of the pandemonium uses the most activated "words". (this may be in conflict with lamb in treating words as things - but maybe not)

Aphasia is the loss of or damage to the ability to speak. In Broca's aphasia the patient is aware of the problem (stuck on the tip of the tongue). In jargon aphasia the patients are unaware of the problem as they issue phrase salad. In confabulation people make up stories without being aware that they are doing so. In schizophrenia the patients are actually talking to themselves (it is their voice) and often can be fixed by having the patient hold their mouth open)

Chapter 9. The Architecture of the Human Mind.

This chapter states the hypothesis and briefly explores its components and the material from which it draws and contrasts.

There is no single, definitive "stream of consciousness," because there is no central Headquarters, no Cartesian Theatre where "it all comes together" for the perusal of a Central Meaner. Instead of such a single stream (however wide), there are multiple channels in which specialist circuits try, in parallel pandemoniums, to do their various things, creating Multiple Drafts as they go.

Most of these fragmentary drafts of "narrative" play short-lived roles in the modulation of current activity but some get promoted to further functional roles, in swift succession, by the activity of a virtual machine in the brain. The seriality of this machine (its "von Neumannesque" character) is not a "hard-wired"

design feature, but rather the upshot of a succession of coalitions of these specialists. The basic specialists are part of our animal heritage. They were not developed to perform peculiarly human actions, such as reading and writing, but ducking, predator-avoiding, face recognizing, grasping, throwing, berry-picking, and other essential tasks. They are often opportunistically enlisted in new roles, for which their native talents more or less suit them. The result is not bedlam only because the trends that are imposed on all this activity are themselves the product of design. Some of this design is innate, and is shared with other animals. But it is augmented, and sometimes even overwhelmed in importance, by micro-habits of thought that are developed in the individual, partly idiosyncratic results of self-exploration and partly the predesigned gifts of culture. Thousands of memes, mostly borne by language, but also by wordless "images" and other data structures, take up residence in an individual brain, shaping its tendencies and thereby turning it into a mind.

ACT* is a parallel computing architecture that has multiple daemon writing to a shared workspace simultaneously. There are then a fixed hierarchy of conflict resolution procedures.

Soar is another parallel computing architecture which manages conflicts by creating a new workspace to solve them and thereby increases its capabilities as a result.

"Thus the issue for the standard computer is how to be interrupted, whereas the issue for Soar and ACT* (and presumably for human cognition) is how to keep focused." pg 269 attributed to Rosenbloom and Laird (1989) pg 119

Some models of cortical recruitment strongly suggest that the primary systems of the brain (dedicated to vision or parietal or what-have-you) must take on a secondary representation role that bears little or no relationship to the primary role.

Neurophysiologists have tentatively identified mechanisms in neurons (NMDA receptors and von der Malsburg synapses) which are plausible candidates as rapid modulators of connectivity between cells (see Flohr 1990)

David Marr (in "Vision" 1982) developed a 3 layer approach to functional analysis which has enabled great developments in vision modelling (1. And information processing task, 2 a algorithmic analysis and 3. the neural machinery)

The human techniques of representing things to ourselves is powerful in its ability to plan, stiffen

resolve to achieve long term gain, self reminding and memory rehearsal. Baars (1998) has proposed the broadcasting effect which enables anything that we have learned to be used in any problem.

"Anyone or anything that has such a virtual machine as its control system is conscious in the fullest sense, and is conscious because it has the virtual machine" pg 281.

Chapter 10. Show and Tell.

Rotating images in the mind's eye. Interestingly, the time it takes to rotate images in the mind's eye is proportional to the degrees of rotation required – also there is evidence for inertia and momentum effects in rotation.

Our ability to manipulate 3-D objects and 2-D images in our mind's eye is limited and recognition is often severely inhibited by seeing an image in an unusual orientation. This limitation is the reason CAD systems exist and add considerable value.

Consider a 3x3 crossword puzzle with the words GAS, OIL & DRY in the 3 columns – what do the rows say? Try also (OPT NEW EGO) and (FOE INN TED). These are trivial mental imagery problems which are not generally easy to complete.

"It is quite common when encountering a new abstract structure in the world – musical notation, a computer programming language, common law, major league baseball – to find yourself trudging back and forth over its paths, making mind-ruts for your self – really digging in and making yourself at home" pg 300.

Talking to oneself is effective in reinforcing both good and bad behaviours.

Language plays an important role in both enabling and constraining what humans are able to think.

Folk psychology takes the distinction between "x knows y's mental state" and "x has a belief about y's mental state" and erroneously applies it to a single person to get anomalies such as "x has a belief about x's mental state" and therefore there must be "higher order" thoughts!

Zombies are an impossibility.

"The emergence of an expression is precisely what creates or fixes the content of the higher-order thought expressed. There need be no additional episodic 'thought'. The higher-order state literally depends on – causally depends on – the expression

of the speech act. But not necessarily on the public expression of an overt speech act.” pg 315.

Chapter 11. Dismantling the Witness Protection Program.

Blind-sight occurs when part of the occipital lobe is damaged and the patient is blind in an area of vision. These patients can however, when prompted, guess above chance, basic visual stimulus in the blind region (a flash occurred or a shape). Contrast this with hysterical blindness where the patient often guesses below chance and does not require prompting. Blind sight patients are not partial zombies but people who can not make a discrimination.

Dennett suggests attempting to train blind-sight patients to know when to guess what is in the blind region (using external sensors) so that they can benefit from their “unconscious” skill.

The game of hide the thimble involves one child placing a thimble in a room in plain view. The remaining children enter the room and upon finding the thimble sit down and watch the remaining players at times look straight at the thimble without “seeing it”. This is a demonstration that something can be in the field of view and retina stimulated without being “conscious”.

The identification machinery and the location machinery are located in different parts of the brain and rare brain damage patients can have one without the other.

Functional prosthetic vision has been developed with a 20x20 pixel camera sending signals (stimulus) to the skin on the back or stomach of a blind person. A version with a zoom function can cause the user to duck when the zoom is tampered with by the experimenter. The area of stimulus can be moved to a different area and the user can continue to interpret the sensations. The sensations are not noticed after a while and are not confused with itches.

The idea that blind-spots are filled in by the brain is a give-away of the vestiges of the Cartesian theatre. The brain simply ignores blind-spots as there is no useful information arriving. How is the blind-spot caused by our occipital nerve different to the area behind us?

Humans are trichromats with three different types of photo-pigmented transducer cells in the cones of our retinas. Pigeons are tetrachromats.

When one sees wall paper the pattern is assumed to be elsewhere but it is not either filled-in or checked until that information is required for some reason.

Petitmal epileptic seizures are only noticeable to the sufferer via inference of the discontinuity of events.

One of the most striking features of consciousness is its discontinuity (blind-spots and saccadic gaps) because of the apparent continuity of consciousness. “The absence of representation is not the same as the representation of absence” pg 359.

We tend to assume that rather more information is stored in the brain and tend to ignore the practice of retrieving information from the environment as needed (ie storage efficiency)

Human eyes dart around in saccades which are muscular contractions which result in ballistic movements of the eyeballs between fixation points. By tracking the eye movements and predicting the next fixation point, a word can be written on a screen at that point before the fixation lands – the person is completely unaware of the alteration but onlookers see the screen in continuous change. However, if the word is moved to remain under the gaze of the eyeball during the saccades movement then it is noticed – this shows that vision is active during the movement but usually ignored as the image is rushing by too quickly to be useful.

Chapter 12. Qualia Disqualified.

The idea of qualia is a knotted kite string (based on self reference, intuition and the Cartesian theatre) that should be just thrown away and replaced with a new string (based on the Multiple drafts model)

Colour does not exist in the absence of an observer. Colours do not map directly to any objective physical measurement of light. Colour and colour discriminators evolved in concert to assist some biological process or another such as making honey and transferring pollen. The “colour” is only meaning full to a particular observer and what action they take as a result of the discrimination.

Birds, fish, reptiles, insects and humans are trichromatic. Other mammals are not.

We might be tempted to say that someone is beautiful despite there being no observer. We would not say that someone was suspect in the absence of an observer. However, there is no essential difference between these two situations and with colour. “Colour” is a discrimination made by the

observer.

"If some creature's life depended on lumping together the moon, blue cheese, and bicycles, you can be pretty sure that Mother Nature would find a way for it to 'see' these as 'intuitively just the same kind of thing.'" pg 381

"The only readily available way of saying just what shape property M is, is just to point to the M-detector and say that M is the shape property detected by this thing here." pg 382

Consider what it was like for a Leipzig Lutheran to have heard J.S.Bach's choral cantatas. They contain chorales and traditional hymn melodies that would have been deeply familiar to these first listeners and they would have heard something different to what we hear today because we do not have the same network in which to interpret it. Imagine further that a new – never before played – Bach cantata was discovered and played for the first time. Unfortunately – by coincidence – the first seven notes match those of Rudolph the red nosed reindeer! We could not possibly hear it as Bach might have heard it in his lifetime if it were played.

Similarly – we usually do not like our first sip of beer but later it tastes different and pleasant.

Inverted qualia are a nonsense philosophical fantasy. Is the switch from Red to Green made before or after the Cartesian theatre? Mary the colour scientist who has never seen colour is another.

Many likes and dislikes (ie Brussel sprouts) may have not modern or historical relevance. They can well be simple inert consequences of other evolutionary changes.

The brain does not store all information – rather it often leaves it in the environment to be accessed when required.

Chapter 13. The Reality of Selves.

The human being spins a self with a "web of discourses" [Robyn]

"We, in contrast, are almost constantly engaged in presenting ourselves to others, and to ourselves, and hence representing ourselves in language and gesture, external and internal. The most obvious difference in our environment that would explain this difference in our behaviour is the behaviour itself. Our human environment contains not just food and shelter, enemies to fight or flee, and con-specifics

with whom to mate, but words, words, words. These words are potent elements of our environment that we readily incorporate, ingesting and extruding them, weaving them like spider-webs into self-protective strings of narrative. Indeed, as we saw in chapter 7, when we let in these words, these meme-vehicles, they tend to take over, creating us out of the raw materials they find in our brains." pg 417

"These strings or streams of narrative issue forth as if from a single source - not just in the obvious physical sense of flowing from just one mouth, or one pencil or pen, but in a more subtle sense: their effect on any audience is to encourage them to (try to) posit a unified agent whose words they are, about whom they are: in short, to posit a centre of narrative gravity. Physicists appreciate the enormous simplification" pg 418

There are thousands of documented cases of Multiple Personality Disorder (MPD). They almost invariably owe their existence to prolonged early childhood abuse, usually sexual, and of sickening severity.

There may actually be a case of one self occupying two bodies in the identical twins Greta and Freda Chaplin.

The self may be just as gappy as consciousness. Are you the same person who's kindergarten adventures you sketchily recall??

Selves are but artefacts of the social processes that create us.

Only very occasionally split brain patients exhibit a temporary (minutes) and primitive independent centre of narrative gravity.

Consider Dr Jekyll and Mr Hyde. If there were two identical twins sharing the same body how would you know?

"Whatever happens, where or when, we're prone to wonder who or what's responsible. This leads us to discover explanations that we might not otherwise imagine, and that helps us predict and control not only what happens in the world, but also what happens in our minds. But what if those same tendencies should lead us to imagine things and causes that do not exist? Then we'll invent false gods and superstitions and see their hand in every chance coincidence. Indeed, perhaps that strange word "I" -as used in "I just had a good idea"- reflects the selfsame tendency. If you're compelled to find some cause that causes everything you do-why, then, that something needs a name. You call it "me." I call it "you." Marvin Minsky (1985), p. 232

The basic form of self identification (external and internal) is “do something and see what moves”

Immortality is possible if we could only move our Jocean macing into a more robust hardware.

Chapter 14 – Consciousness Imagined.

Yes we can imagine a conscious robot – we do it regularly R2D2, C3PO, Hal – we just cant imagine how to construct one (yet)

On Searle's Chinese room – Complexity does matter! Don't discount it because you cannot imagine it.

What is it like to be a bat? Different! If a lion could talk the he could not tell us much about how it is to be a lion because he would be so incredibly different from the normal lions.

“...the capacity to suffer is the function of the capacity to have articulated, wide-ranging, highly discriminative desires, expectations, and other sophisticated mental states.” pg 449

Horses and dogs show some capacity to suffer. Apes, elephants and dolphins apparently have a much greater capacity.

The ability to have fun is the compensation for the capacity to suffer – it is dependent on sufficient cognitive capacity for the luxuries of imagination and leisure. “The greater the scope, the richer the detail, the more finely discriminative the desires, the worse it is when those desires are thwarted” pg 450.

Hens kept outside scratch a lot. They choose a cage with litter over one with a hard floor. They will enter a very small cage with litter in order to scratch. In order to establish that hens suffer without litter, hens were allowed to choose between a wire-floor cage with food and water and a litterer floored cage without food and water. They spent a lot of time in the litter cage and only went to the other for food and water. But – when the birds had to work to move between cages (push thru a black plastic curtain or jump from a corridor) the hens spent the same amount of time in the food & water cage, but hardly any time in the litter cage. Conclusion “Suffering by the emotional mind is revealed by animals that have enough of a rational mind to be able to do something about the conditions that make them suffer”

People can believe whatever they want – but we

should not make policy and resource decisions based on myth (ie issues such as euthanasia, capital punishment, abortion, or meat eating)

Appendix for philosophers

covers some technical issues and refers to two of Dennett's previous texts to resolve them

Appendix for Scientists

- suggests some experiments to lend weight to some claims.

Further reading

- See pg 134, 145, 147, 148,
- Valentino Braitenberg. Vehicles: essays in synthetic psychology (1984)
- Oliver Selfridge (1959) Pandemonium architecture for AI.
- Douglas Hofstadter, Artificial Intelligence" 1985)
- Nicholas Humphrey (1976, 1983a, 1986)
- Simon and Kaplan 1989 pp 18-19.
- Roger Schank 1977 with abelson and more recently in 1991
- Patrick Hayes 1979
- Marvin Minsky 1975
- John Anderson 1983
- Erik Sandevel 1991
- Newell 1990
- Minsky “The Society of Mind”
- Flohr 1990
- Mary Stamp Dawkins (1987)