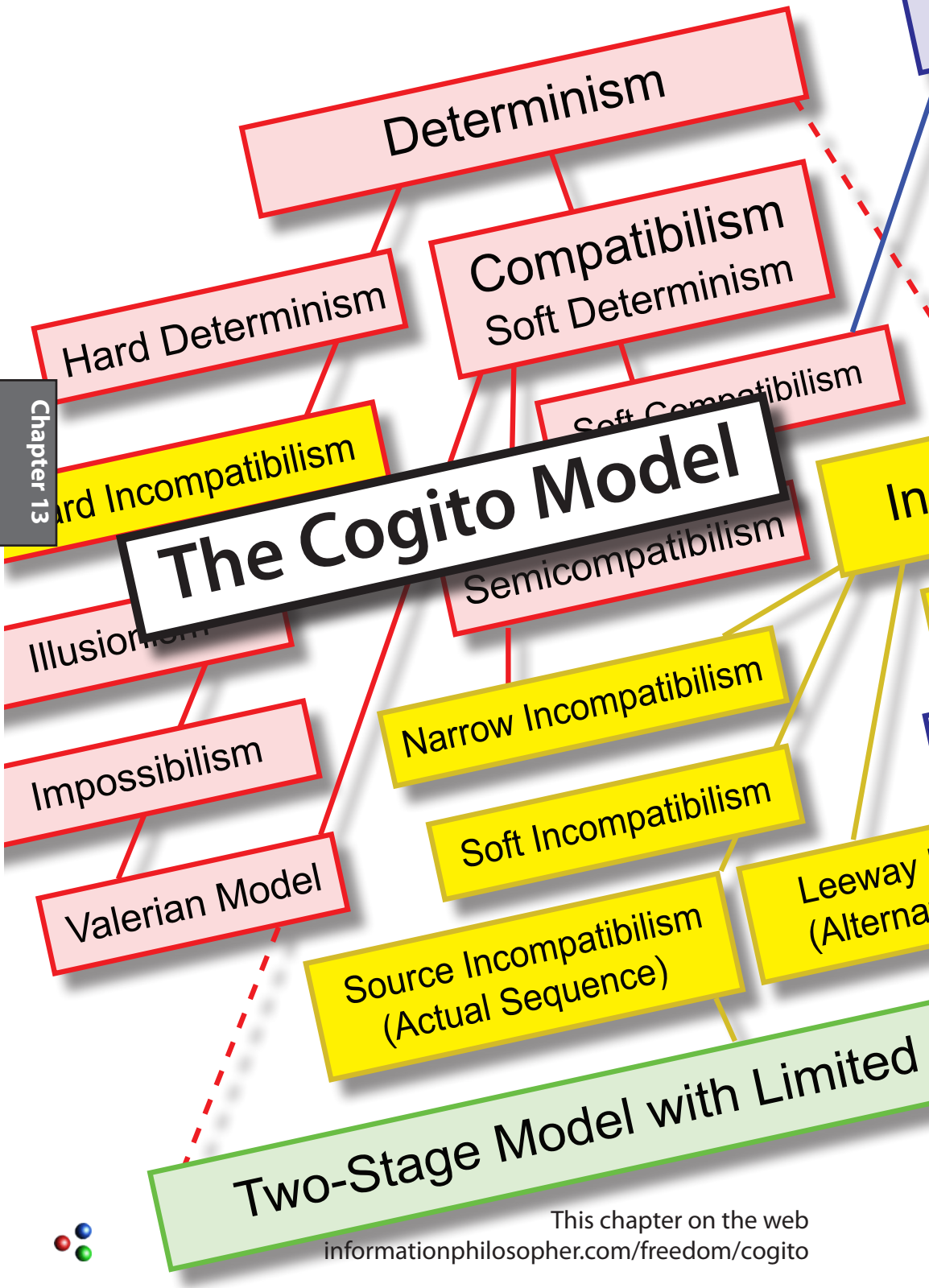

This chapter on the web
informationphilosopher.com/freedom/cogito

The Cogito Model

The Cogito Model of human freedom locates randomness (either ancient **chance** or modern **quantum indeterminacy**) in the mind, in a way that breaks the causal chain of physical **determinism**, while doing no harm to **responsibility**.

The Cogito Model combines indeterminacy - first microscopic quantum randomness and unpredictability, then "adequate" determinism and macroscopic predictability, in a temporal sequence that creates new **information**.

Important elements of the model have been proposed by many philosophers since ARISTOTLE, the first indeterminist.

The insoluble problem for early attempts to incorporate indeterminism has been to explain how a random event in the brain can be timed and located - perfectly synchronized! - so as to be relevant to a specific decision. The answer is that it cannot be, for the simple reason that quantum events are totally unpredictable. Early attempts could not locate the randomness so as to make free will "intelligible," as libertarian ROBERT KANE puts it.

Two-stage models do not involve single random events, one per decision, but many random events in the brain that lead to **alternative possibilities** for the **adequately determined** will to evaluate and decide between.

As we saw in the last chapter, a number of modern philosophers and scientists, starting with WILLIAM JAMES, have proposed two-stage models of free will. So how is the Cogito model different? The Cogito model is the first to specify how it is that quantum indeterminacy creates the **alternative possibilities**.

I shall argue that **noise** generates new possibilities based on random variations of old experiences and knowledge.

The source of the randomness is the ever-present noise, both quantum and thermal noise, that is inherent in any information storage and communication system.

The mind, like all biological systems, has evolved in the presence of constant noise and is able to ignore that noise, unless the noise provides a significant competitive advantage, which it clearly can do as the basis for freedom and creativity.

Let's first see how randomness in the Cogito Model is never the direct cause of our decisions. Decisions themselves are normally **adequately determined**.

We assume that there are always many contributing causes for any event, and in particular for a mental decision. All the events in the past "light-cone" of special relativity can contribute causes.

In the Allan Newell - Herbert Simon "Blackboard" model and in Bernard Baars' "Theater of Consciousness" and "Global Workspace" models, there are many competing possibilities for our next thought or action.

Each of these possibilities is the result of a sequence of events that goes back in an assumed causal chain until its beginning in an uncaused event. Aristotle called this original event an archē (ἀρχῆ), one whose major contributing cause (or causes) was itself uncaused. In modern terms, it involved quantum indeterminacy.

In Figure 13-1, we show many contributing causes as causal chains going back in time, in principle to the origin of the universe. None of them is completely controlling, but all make contributions to the decision process.

On the left, Bernard Baars' players in the Theater of Consciousness, or Daniel Dennett's functional homunculi, have causal chains that go back to Nature and Nurture – hereditary, environmental, and educational causes - and in principle beyond.

In the middle, the causes have chains that go back to Robert Kane's character development by Self-Forming Actions (SFAs).

On the right, my causes are brand new possibilities generated randomly *immediately after* being confronted by the circumstances from the "Fixed Past" and the "Laws of Nature." After evaluation of the alternatives, the new decision might be one of Kane's SFAs, contributing to our developing character.

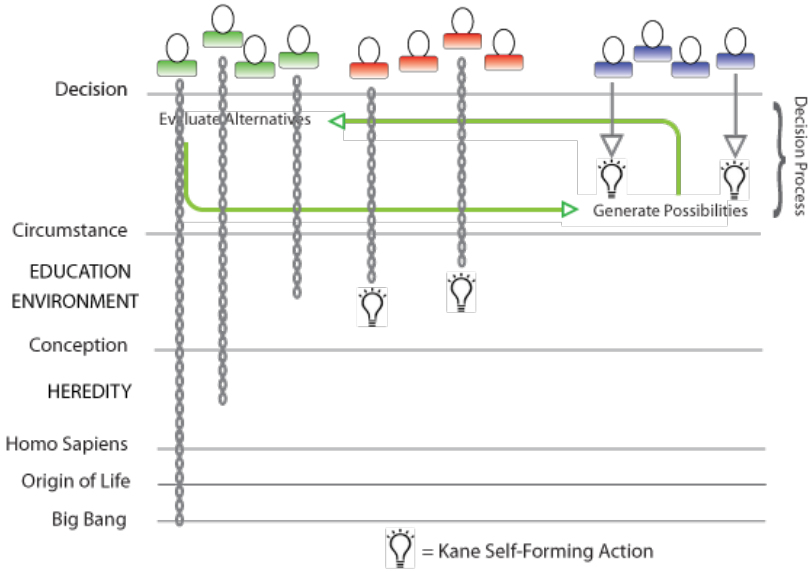

Figure 13-1. Decisions have many contributing causes

Consider contributing causes of a decision on the left of the figure that go back before the birth of an agent, hereditary causes for example. To the extent that such causes **adequately determine** an action, we can understand why hard determinists think that the agent has no control over such actions.

But as long as we can opt out of those ancient causal chains at the last moment (Roderick Chisholm points out that saying "no" is always an alternative possibility), and follow one of the new possibilities generated on the right, we retain enough control, and can properly take **responsibility** for our decisions.

Other contributing causes may be traceable back to environmental and developmental events, perhaps education, perhaps simply life experiences that were "character-forming" events. These and hereditary causes would be present in the mind of the agent as fixed habits, with a very high probability of "adequately determining" the agent's actions in many commonplace situations.

But other contributing causes of a specific action may have been undetermined up to the very near past, even fractions of a second before an important decision. The causal chains for these contributing causes originate in the noisy brain. They include the free generation of new **alternative possibilities** for thought or action during the agent's deliberations. They fit ARISTOTLE's criteria for causes that "depend on us" (ἐφ' ἡμῖν) and originate "within us" (ἐν ἡμῖν).

Causes with these most recent starting points are the fundamental reason why an agent can **do otherwise** in what are essentially (up to that starting point) the **same circumstances**. These alternatives are likely generated from our internal knowledge of practical possibilities based on our past experience.

Note that those possibilities that are handed up for consideration to Baars' "executive function" may be filtered to some extent by unconscious processes to be "within reason." They likely consist of random variations of past actions we have willed many times in the past.

Note that the evaluation and selection of one of these possibilities by the will is as deterministic and causal a process as anything that a determinist or compatibilist could ask for, consistent with our current knowledge of the physical world.

But instead of strict causal determinism, evaluation and selection involve only **adequate determinism**, and the indeterministic origins of alternative possibilities provides libertarian freedom of thought and action.

The Micro Mind

Imagine a Micro Mind with a randomly assembled "agenda" of possible things to say or to do. These are drawn from our memory of past thoughts and actions, but randomly varied by unpredictable negations, associations of a part of one idea with a part or all of another, and by substitutions of words, images, feelings, and actions drawn from our experience. In information communication terms, there is cross-talk and noise in our neural circuitry.

In a "content-addressable" information model, memories are stored based on their content - typically bundles of simultaneous images, sounds, smells, feelings, etc. So a new experience is likely to be stored in neural pathways alongside closely related past experiences. And a fresh experience, or active thinking about an experience that presents a decision problem, is likely to activate nearby brain circuits, ones that have strong associations with our current circumstances. These are likely to begin firing randomly, to provide unpredictable raw material for actionable possibilities.

The strong feeling that sometimes "we don't know what we think until we hear what we say" reflects our capability for original and creative thoughts, different from anything we have consciously learned. Something as simple as substituting a synonymous word, or more complex replacements with associated words (metonyms) or wild leaps of fancy (metaphor) are examples of building unpredictable thoughts. Picturing ourselves doing something we have seen others do, from "monkey see, monkey do" childhood mimicry to adult imitations, is a source for action items on the agenda, with the random element as simple as if and when we choose to do them.

The etymology of cogito is Latin co-agitare, to shake together. Why do we need quantum uncertainty involved in the shaking together of our agenda items? Will neuroscientists ever find information structures in the brain to generate our random agenda, structures small enough to be susceptible to microscopic quantum phenomena?

Speculations include the microtubules of the cellular cytoskeleton, tiny (25nm) structures that Roger Penrose and Stuart Hameroff believe may mediate consciousness. But will neuroscientists be able to distinguish random from non-random processes?

It is most unlikely that physically localized visually distinguishable random processes will be found. In the Cogito model, the randomness of the Micro Mind is simply the result of ever-present noise, both thermal and quantum noise, that is inherent in any information storage and communication system.

Constant, ever-present noise removes an important technical objection. Critics of the Epicurean swerve of the atoms asked when and where and how would a random event occur? The Cogito model randomly generates contextually appropriate alternative possibilities at all times.

The Cogito model is not a mechanism. It is a process, and information philosophy is a process philosophy.

Quantum uncertainty adds a "causa sui," an uncaused or self-caused cause, in the causal chain. But it need not directly determine the decision of the macroscopic will or the fully determined resulting action which is consistent with character and values.

Some argue that brain structures are too large to be affected at all by quantum events. But there is little doubt that the brain has evolved to the point where it can access quantum phenomena. The evolutionary advantage for the mind is freedom and creativity. Biophysics tells us that the eye can detect a single quantum of light (photon), and the nose can smell a single molecule.

The Macro Mind

If the Micro Mind is a random generator of frequently outlandish and absurd possibilities, the complementary Macro Mind is a macroscopic structure so large that quantum effects are negligible. It is the critical apparatus that makes decisions based on our character and values.

Information about our character and values is stored in the same noise-susceptible neural circuits of our brain, in our memory. So Macro Mind and Micro Mind are not necessarily in different locations in the brain. Instead, they are the consequence of different information processing methods.

The Macro Mind must suppress quantum noise when it makes an adequately determined decision.

The Macro Mind has very likely evolved to add enough redundancy, perhaps even the kind of error detection and correction we have in computers, to reduce the noise to levels required for an adequate determinism.

Our decisions are then in principle predictable, by a super-psychiatrist who was given knowledge of all our past experiences and given the randomly generated possibilities in the instant before a decision. However, only we know the contents of our minds. They exist only within our minds. Thus we can feel fully responsible for our choices, morally and legally.

The Cogito model accounts not just for freedom but for creativity, for original thoughts and ideas never before expressed. Unique and new information comes into the world with each new thought and action.

Biologists will note that the Micro Mind corresponds to random variation in the gene pool (often the direct result of quantum accidents). The Macro Mind corresponds to natural selection by highly determined organisms. See the biology discussion in Chapter 16 for other examples of random generation followed by adequately determined selection, like the immune system and protein/enzyme factories.

Psychologists will see the resemblance of Micro Mind and Macro Mind to the Freudian id and the super-ego (*das Ess und das Über-ich*).

The model accounts quantitatively for the concept of wisdom. The greater the amount of knowledge and experience, the more likely that the random agenda will contain more useful and "intelligent" thoughts and actions as alternative possibilities.

It also implies **degrees of freedom**. An educated mind is "more free" because it can generate a wider agenda and options for action. It suggests that "narrow" and "closed" minds may simply be lacking the capabilities of the Micro Mind. And if the Macro Mind were weak, it might point to the high correlation between creativity and madness suggested by a Micro Mind out of control.

Philosophers of Mind, whether hard determinist or compatibilist, should recognize this Macro Mind as everything they say is needed to make a carefully reasoned free choice.

But now choices include self-generated random possibilities for thought and action that no external agent can predict. Thus the

choice of the will and the resulting willed action are unpredictable. The origin of the chosen causal chain is entirely within the agent, a condition noted first by Aristotle for voluntary action, his ἐν ἡμῖν ("in us").

The combination of microscopic randomness and macroscopic determinism in our **Cogito** model for human freedom means it is both unpredictable and yet fully responsible for its willed actions. Chance in the first stage never leads directly to - never directly "causes" - an action.

Chance in the first stage provides the variety of **alternative possibilities**, each the possible start of a new causal chain, from which the deterministic judgment can choose an alternative that is consistent with its character and values. Our will is **adequately determined** and in control of our actions.

Note that the second stage may sometimes result in a willed decision to "flip a coin" and choose at random from the given alternatives. This is the ancient "**liberty of indifference**."

While it is chance that "determines" our action in this case, we are prepared to take responsibility, because we are choosing between alternatives that have all been adequately determined by good reasons. I call these "**undetermined liberties**." Robert Kane's Self-Forming Actions are a subset of undetermined liberties.

On the opposite page, I distinguish six increasingly sophisticated aspects on the role of chance and **indeterminism** in any **libertarian** model of free will.

Many libertarians have accepted the first two. Determinist and compatibilist critics of free will make the third their central attack on chance. It is the **randomness objection**.

But very few thinkers appear to have considered the last three essential requirements for chance to contribute to any model of **libertarian** free will, and especially the last two - that chance must be ever present, throughout the brain - but that it is always suppressible *at will*.

Six Critical Aspects of Chance

1. Chance exists in the universe. Quantum mechanics is correct. **Indeterminism** is true.

2. Chance is important for free will. It breaks the causal chain of **determinism**.

3. Chance cannot directly cause our actions. We cannot be responsible for random actions, unless we "deliberately" choose at random an **undetermined liberty**.

4. Chance can only generate random (unpredictable) **alternative possibilities** for action or thought. The choice or selection of one action must be **adequately determined**, so that we can take **responsibility**. And once we choose, the connection between mind/brain and motor control must be adequately determined to see that "our will be done."

5. Chance, in the form of **noise**, both quantum and thermal, must be ever present. The naive model of a single random microscopic event, amplified to affect the macroscopic brain, never made any sense. Under what *ad hoc* circumstances, at what time, at what place in the brain, would it occur to affect a decision?

6. Chance must be overcome or suppressed by the adequately determined will when it decides to act, de-liberating the prior free options that "one **could otherwise have done**."

In our Cogito model, "Free Will" combines two distinct concepts. "Free" is the chance and randomness of the Micro Mind. "Will" is the adequately determined choice of the Macro Mind. And these occur in a **temporal sequence**.

> Compatibilists and Determinists were right about Will,
> but wrong about Freedom.
> Libertarians were right about Freedom,
> but wrong about Will.

The Temporal Sequence of Free and Will

Free Will is best understood as a complex idea combining two antagonistic concepts - freedom and determination.

Many philosophers have called free will "unintelligible" because of this internal contradiction and the presumed simultaneity and identity of free and will.

Specifically, they mistakenly have assumed that "free" is a time-independent adjective modifying "will." And they have often taken "free" pejoratively to mean "random."

A careful examination of ordinary language usage shows that free will is actually a temporal sequence of two opposing concepts - first "free" and then "will."

First comes the consideration of alternative possibilities, which are generated unpredictably by acausal events (simply noise in neural network communications). This free creation of possible thoughts and actions allows one to feel "I can do otherwise."

Next comes de-liberation and determination by the will, the un-freeing of possibilities into actuality, the decision that directs the tongue or body to speak or act.

After the deliberation of the will, the true sentence "I can do otherwise" can be changed to the past tense and remain true as a "hard fact" in the "fixed past," and written "I could have done otherwise."

Thus we have the **temporal sequence** which William James saw so clearly over a century ago, with chance in a present time of random alternatives, leading to a choice which grants consent to one possibility and transforms an equivocal future into an unalterable and simple past.

Since the chance suggestions for alternative possibilities appear first in the theater of consciousness (though they are largely unconscious and competing for attention), the delay before a conscious choice could easily account for the results of Benjamin Libet's experiments. See the explanation of Libet's experiments as a predictable consequence of the two-stage model in Chapter 17 on neuroscience.

As John Locke knew more than three hundred years ago, "free" is an adjective that describes not the will, but the human mind.

Just as "free" needs to be separated from "will," we think "moral" should be separated from "responsibility." Furthermore "free will" should be separated from "moral responsibility" and "moral responsibility" should be separated from "retributive punishment" and vengeance. See Chapter 20 for more on the notion of separating these core concepts in the free will debates.

A Mind Model

Given the "laws of nature" and the "fixed past" just before a decision, philosophers wonder how a free agent can have any possible alternatives. This is partly because they imagine a timeline for the decision that shrinks the decision process to a single moment.

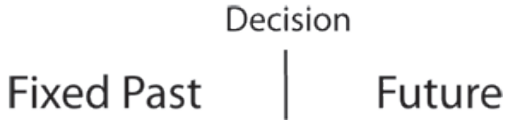

Figure 13-2. Decision as a single moment in time.

Collapsing the decision to a single moment between the closed fixed past and the open ambiguous future makes it difficult to see how free thoughts of the mind are followed by the willed and adequately determined action of the body in a **temporal sequence**, as shown in Figure 13-3.

Figure 13-3. Decision as a two-stage temporal process

But the Cogito Mind Model is not limited to a single step of generating **alternative possibilities** followed by a single step of determination by the will. It is better understood as a continuous process of possibilities generation by the **Micro Mind** (parts of the brain that leave themselves open to noise) and **adequately determined** choices made from time to time by the Macro Mind (the same brain parts, perhaps, but now averaging over and filtering out the noise that might otherwise make the determination random).

Second Thoughts

In particular, note that a special kind of decision might occur when the Macro Mind finds that none of the current options are good enough for the agent's character and values to approve. The Macro Mind then might figuratively say to the Micro Mind, "Think again!"

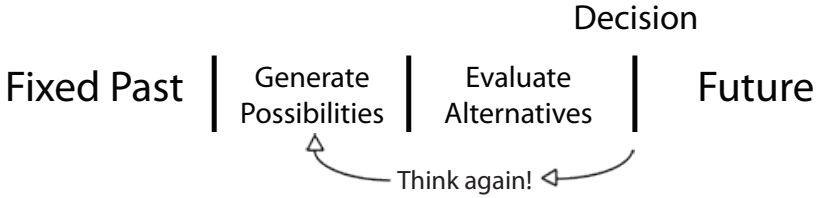

Figure 13-4. Decisions are not determined as soon as alternatives are generated.

Critics of two-stage models often say that once the alternative possibilities are generated, the agent is "determined" to choose the best alternative, and thus they are not truly free.

First, we can see in Figure 13-4 that the agent is free to go back, time permitting, and generate more possibilities, until a really good alternative appears.

Second, because some of the alternatives generated may be truly new information that presented itself at random, there is no way that the agent's action was **pre-determined** by the laws of nature and the fixed past before the generation of **alternative possibilities** began. This is the core freedom of the Cogito model, even when the decision is adequately determined.

Doing Otherwise in the Same Circumstances

Many philosophers of mind and action have puzzled how an agent could do otherwise in exactly the **same circumstances**. Of course, since humans are intelligent organisms with memories, and given the myriad of possible circumstances, it is simply impossible that an agent is ever in exactly the same circumstances. The agent's memory (stored information) of earlier similar circumstances guarantees that.

So how can an agent do otherwise in exactly the **same circumstances**? First, we need to postulate that the agent can be in the very same circumstances. There are two ways we can do this.

One way is to imagine that the universe can be put back into the same circumstances, as William James first suggested,[1] and as Peter van Inwagen imagined God could do with his "instant replays." [2]

The second way is to relax the exactness required to merely very similar circumstances. It is enough that the agent simply believes the circumstances are the same, perhaps because they resemble a situation seen so many times before that the memory of earlier occasions is blurred.

The **Cogito** model can then explain how an agent can do otherwise in the same circumstances, given the "fixed past" and the "laws of nature," where the circumstances are defined as the moment before alternative possibilities begin to be generated. See figure 13-5 for the line that defines the moment of the starting circumstances that invoke possibilities generation. In our horizontal timeline view, we then have the following situation.

1 James (1956) p. 155.
2 Van Inwagen (2004) p. 227.

Figure 13-5. Doing otherwise in the same circumstances.

This view still makes an artificial separation between Micro Mind creative randomness and Macro Mind deliberative evaluation. These two capabilities of the mind can be going on at the same time. That can be visualized by the occasional decision to go back and think again, when the available alternatives are not good enough to satisfy the demands of the agent's character and values, or by noticing that the Micro Mind may still be generating possibilities while the Macro Mind is in the midst of evaluations.

Finally, not all decisions in the Cogito model end with an adequately determined **de-liberation** or **self-determination**. Many times the evaluation of the possibilities produces two or more alternatives that seem more or less of equal value.

Undetermined Liberties

In these cases, the agent may choose randomly among the alternatives, and yet have good reasons to take responsibility for whichever one is chosen. This is the **liberty of indifference**.

I call these **undetermined liberties**, because they remain undetermined until the moment of the decision. The choice is not completely determined by the deliberations, although we can still say that the agent "deliberately" chooses at random.

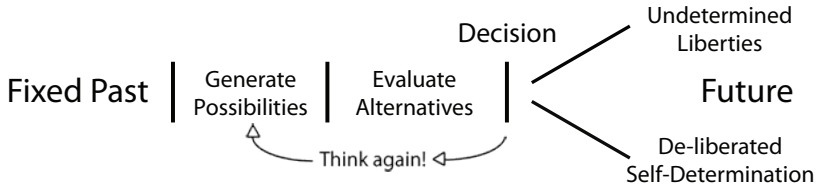

Figure 13-6. Undetermined Liberties and Self-Determination

The choice between undetermined liberties results in a kind of *arbitrary* self-determination that resembles the ancient *liberum arbitrium* notion of free will.

Free Thoughts, Willed Actions

Our thoughts are free and often appear simply to "come to us." Our actions are adequately determined for **moral responsibility** and appear, especially to others, to "come from us." They are "**up to us**" (Aristotle's ἐφ' ἡμῖν), our **self-determination**.

What then are the sources of alternative possibilities? To what extent are they our creations? We can distinguish three important sources, all of them capable of producing indeterministic options for thoughts and actions.

The first source is the external world that arrives through our perceptions. It is perhaps the major driving force in our lives, constantly requiring our conscious attention. Indeed, consciousness can be understood in large part as the exchange of actionable information between organism and environment. Although the indeterministic origin of such ideas is outside us, we can take full responsibility for them if they inspire our adequately determined willed actions.

The second source of options is other persons. The unique human ability to communicate information verbally means that alternative possibilities for our actions are being generated by our conversations, by reactions to the random thoughts of other minds. Peter Strawson's reactive attitudes come to mind.

Finally, and most importantly, our Micro Mind generates possibilities internally. These are the possibilities that truly originate within us (Aristotle's ἐν ἡμῖν).

Note that the sources of random options not only need not be internal, even internal random thoughts need not be contemporaneous with the current decision, as long as they "come to mind" as alternatives. They may have been originally generated at much earlier times in the agent's life, and only now get reconsidered and perhaps now get acted upon.

The Cogito Model Compared to Other Models

The **Cogito** Model can be seen as providing a purely physical explanation for **agent-causal libertarianism**.

"Agent-causal or "non-causal" views are thought to involve a form of "substance dualism" that makes the mind a different substance from the body, exempt from ordinary causality.

There is a sense in which the **Cogito** model shares aspects with the metaphysical idea of an immaterial substance dualism.

In so far as pure **information** is non-material, neither matter nor energy, more akin to spirit, genuinely new information entering the universe through the mind is a kind of "agent causality."

But the Cogito Model is primarily an "event-causal" view that locates breaks in the deterministic causal chain "in us," in our deliberations. These include the internal uncaused generation of new possibilities.

Indeterminism also arises from random sensory inputs from the environment and from communication with other persons.

And the Cogito Model now includes indeterminism in the final moment of choice, for those cases where the second stage has not narrowed down options to a single self-determined choice.

The Cogito Model is very similar to the two-stage models of Daniel Dennett and Alfred Mele. But unlike Dennett, the model needs quantum randomness and not simply computational "pseudo-randomness" to generate **alternative possibilities**. And unlike Mele, I believe that science has shown indeterminism to be the case and determinism to be "false." Mele remains an agnostic on these important questions, given the modern focus on **moral responsibility**.

Even if determinism were true, Mele says, we could nevertheless have moral responsibility. I agree that since we do have it, then if determinism were true, we would still have it.

Again, beyond the Dennett and Mele models, the Cogito Model proposes a specific process that avoids the single "quantum event in the brain" that gets amplified perfectly in time with our thought

processes to help with free will. There are billions of quantum events in the brain every second. The miracle of the mind is that it can manage the resulting noise, averaging over these events when it needs to, yet utilizing them when it wants to.

Because the agent is actively controlling the process of deliberation up to the instant of the determining decision at the 'moment of choice,' the Cogito Model shares much with agent-causal views, without being metaphysical.

The "free" stage of the Cogito Model depends on thermal and quantal noise in the neural circuitry of the brain. This noise introduces errors in the storage and retrieval of information, noise that may be helpful in generating **alternative possibilities** for action.

The "will" stage of the Cogito Model suppresses this noise for the **adequately determined** process of evaluation and decision that normally terminates in an act of **self-determination**.

But there are times when more than one option remains at the end of the second stage. These **undetermined liberties** are then resolved in the moment of choice in an undetermined fashion, where the cause of the choice is attributed to the efforts of the agent, as described by Robert Kane in his "self-forming actions."

The Cogito Model is compatible with *both* indeterminism suitably located *and* determinism appropriately limited.

It is thus "doubly compatible" with a limited indeterminism and a limited but "adequate" determinism. This suggests what we call a "**comprehensive compatibilism**," one that might appeal to the many philosophers who prefer **compatibilism** to **libertarianism**.

The Cogito Model is also the only free-will model that is compatible with biological evolution. Chapter 16 will show how it evolved from "behavioral freedom" in lower animals.

This triply-compatible "**comprehensive compatibilism**" is developed in Chapter 28.

Next we turn to several objections that have been raised over the years against two-stage models.