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JAMESIAN FREE WILL, THE TWO-STAGE MODEL OF WILLIAM JAMES

BOB DOYLE

ABSTRACT

Research into two-stage models of “free will” – first “free” random generation of alternative possibilities, followed by “willed” adequately determined decisions consistent with character, values, and desires – suggests that William James was in 1884 the first of a dozen philosophers and scientists to propose such a two-stage model for free will. We review the later work to establish James’s priority.

By limiting chance to the generation of alternative possibilities, James was the first to overcome the standard two-part argument against free will, i.e., that the will is either determined or random. James gave it elements of both, to establish freedom but preserve responsibility. We show that James was influenced by Darwin’s model of natural selection, as were most recent thinkers with a two-stage model.

In view of James’s famous decision to make his first act of freedom a choice to believe that his will is free, it is most fitting to celebrate James’s priority in the free will debates by naming the two-stage model – first chance, then choice – “Jamesian” free will.

THE DECLINE OF DETERMINISM

In the nineteenth century, according to historians of science¹ and philosopher Ian Hacking², there was a “rise in statistical thinking” and an “erosion of determinism.” The strict physical determinism implied by Isaac Newton’s classical mechanics was giving way to the statistical mechanics of physicists James Clerk Maxwell and Ludwig Boltzmann, who assumed that gases were composed of atoms and molecules moving at random and following statistical laws.

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In the United States, William James's colleague Charles Sanders Peirce followed these developments. Peirce was a superb logician and mathematician who mastered probability and statistics. He gave us the name "normal distribution" for the law of errors in scientific measurements. He knew that that inevitable errors in physical measurements meant that that the deterministic laws of nature could never be proved logically *necessary*.³

Peirce developed the idea of randomness as a key element of his philosophy. He called it "Tychism" (after *tyche*, the Greek word for chance).

The ancient Greek philosopher Epicurus had suggested⁴ that random swerves in the otherwise deterministic motions of the atoms provided room for human freedom. But Epicurus' notion of chance as an explanation for free will was ridiculed by the Stoics, the leading philosophers of his time. If determinism deprives us of freedom, indeterminism or chance as the source of action denies us responsibility for our actions.

With so much talk of probability in the nineteenth century, it was becoming more respectable to discuss the possibility of absolute chance. Charles Darwin's theory of evolution included chance variations that could be inherited by an organism's offspring to allow the natural selection of new species. Genuine novelty in the universe needs chance to generate those new possibilities. Otherwise, the existing species would be the predetermined consequence of laws of nature and events in the distant past.

James and Peirce followed the Darwinian arguments closely. Peirce was undoubtedly more familiar than James with the statistical arguments of the physicists. Peirce's main attack was on the idea of logical and necessary truths about the physical world. Peirce was the strongest philosophical voice for absolute chance since Epicurus. He argued that chance liberated the will from determinism, but he gave no definite model, and in the end he compromised and wanted to manage and control the chance with a form of rationality that he called "synechism" or continuity. He dreamed of "evolutionary love" and a God who kept the creative element of chance in check.

Peirce was inspired by Hegel's notion of logic and arranged his arguments in triads, often with Hegel's thesis-antithesis-synthesis structure.⁵ Thus, Peirce's idea of evolution has three levels, the Darwinian (Tychism - random and indeterminate), the Spencerian (Necessity - mechanical and determinate), and Peirce's own (Synechism - union of the two first levels).⁶

Peirce was morally ambiguous about unbridled chance. Although he was the champion of chance, he thought it purposeless. He called Darwinian evolution “greedy.”

Although Peirce is famous for promoting the reality of chance with his Tychism, his overall opinion of chance was negative. We shall see that it is William James who in the end found a measured and constructive role for chance in his attempt to defend freedom of the will. Where Peirce saw chance as a negative force, James, like Darwin, saw it as a creative one.

VIEWS ON FREE WILL BEFORE JAMES

Before James, most philosophers, especially those with theological training, held a dualist view of free will, in which freedom was God’s gift to humanity, a gift that operated in a mind outside the physical universe, for example in Immanuel Kant’s noumenal world beyond the deterministic phenomenal world.

But ever since the seventeenth-century secular arguments of Thomas Hobbes, a significant number of materialist philosophers denied such a libertarian free will. They became “compatibilists” who argued that “voluntary” actions are compatible with strict logical and physical determinism. Hobbes said “the cause of the will is not the will itself, but something else not in his own disposing.” He said “voluntary actions have all of them necessary causes and therefore are necessitated.”⁷ For Hobbes, talk of free agents was nonsense - if free means uncaused and random.

I hold that ordinary definition of a free agent, namely that a free agent is that which, when all things are present which are needful to produce the effect, can nevertheless not produce it, implies a contradiction and is nonsense.⁸

The “voluntarism” of Hobbes and David Hume identified freedom as the absence of external coercive causes. It was *freedom of action*, not freedom of the will. Though the will be determined, as long as the will is one of the causes in the great causal chain, that would be enough freedom for them. They found “free will” to be compatible even with a complete *predeterminism* since the beginning of time.

For Hume, the necessity of causality was found in the human mind,

there is but one kind of necessity, as there is but one kind of cause... 'Tis the constant conjunction of objects, along with the determination of the mind, which constitutes a physical necessity: And the removal of these is the same thing with chance. As objects must either be conjoin'd or not, and as the mind must either be determin'd or not to pass from one object to another, 'tis impossible to admit of any medium betwixt chance and an absolute necessity.⁹

WILLIAM JAMES'S ATTACK ON HOBBS-HUME COMPATIBILISM

In his 1884 address to Harvard Divinity Students in Lowell Lecture Hall,¹⁰ James famously coined the terms "*hard determinism*" and "*soft determinism*," by which he meant the compatibilism of Hobbes and Hume. Hard determinists simply deny the existence of free will altogether.

Old-fashioned determinism was what we may call hard determinism. It did not shrink from such words as fatality, bondage of the will, necessitation, and the like. Nowadays, we have a soft determinism which abhors harsh words, and, repudiating fatality, necessity, and even predetermination, says that its real name is freedom; for freedom is only necessity understood, and bondage to the highest is identical with true freedom.¹¹

James called "soft determinism" a "quagmire of evasion."¹² Immanuel Kant had called it a "wretched subterfuge" and "word jugglery."¹³ And whether it is "hard" or it is "soft," James said that determinism

professes that those parts of the universe already laid down absolutely appoint and decree what the other parts shall be. The future has no ambiguous possibilities hidden in its womb; the part we call the present is compatible with only one totality. Any other future complement than the one fixed from eternity is impossible. The whole is in each and every part, and welds it with the rest into an

absolute unity, an iron block, in which there can be no equivocation or shadow of turning.¹⁴

He argued instead for "*indeterminism*."

Indeterminism, on the contrary, says that the parts have a certain amount of loose play on one another, so that the laying down of one of them does not necessarily determine what the others shall be. It admits that possibilities may be in excess of actualities, and that things not yet revealed to our knowledge may really in themselves be ambiguous. Of two alternative futures which we conceive, both may now be really possible; and the one becomes impossible only at the very moment when the other excludes it by becoming real itself.¹⁵

The stronghold of the determinist argument is the antipathy to the idea of chance...This notion of alternative possibility, this admission that any one of several things may come to pass is, after all, only a roundabout name for chance.¹⁶

THE ANTIPATHY TO CHANCE

How strong is this antipathy to chance among determinists?

The Stoic Chrysippus said that a single uncaused cause could destroy the universe (cosmos),

Everything that happens is followed by something else which depends on it by causal necessity. Likewise, everything that happens is preceded by something with which it is causally connected. For nothing exists or has come into being in the cosmos without a cause. The universe will be disrupted and disintegrate into pieces and cease to be a unity functioning as a single system, if any uncaused movement is introduced into it.¹⁷

John Fiske, a contemporary of James, described the absurd decisions that would be made if chance were real,

If volitions arise without cause, it necessarily follows that we cannot infer from them the character of the antecedent states of feeling. . . . The mother may strangle her first-born child, the miser may cast his long-treasured gold into the sea, the sculptor may break in pieces his lately-finished statue, in the presence of no other feelings than those which before led them to cherish, to hoard, and to create.¹⁸

Some twentieth-century philosophers hold an equally negative view of chance.

The fallacy of [incompatibilism] has often been exposed and the clearest proof that it is mistaken or at least muddled lies in showing that I could not be free to choose what I do unless determinism is correct. For the simplest actions could not be performed in an indeterministic universe. If I decide, say, to eat a piece of fish, I cannot do so if the fish is liable to turn into a stone or to disintegrate in mid-air or to behave in any other utterly unpredictable manner.¹⁹

THE TWO-STAGE MODEL OF WILLIAM JAMES

The genius of the Jamesian picture of free will is that indeterministic chance is the source for what James calls “ambiguous possibilities” and “alternative futures.” The chance generation of such alternative possibilities for action does not in any way limit his choice to one of them. *Chance is not the direct cause of actions.* James makes it clear that it is *his choice* that “grants consent” to one of them.

In his 1884 lecture *The Dilemma of Determinism*,²⁰ James asked some Harvard Divinity School students to consider his choice for walking home after his talk.

What is meant by saying that my choice of which way to walk home after the lecture is ambiguous and matter of chance?...It means that both Divinity Avenue

and Oxford Street are called but only one, and that one *either* one, shall be chosen.²¹

This notion of alternative possibility, this admission that any one of several things may come to pass is, after all, only a roundabout name for chance.²²

With this simple example, James was to my knowledge the first thinker to enunciate clearly a two-stage decision process, with *chance* in a *present* time of random alternatives, leading to a *choice* which grants consent to one possibility and transforms an equivocal ambiguous *future* into an unalterable and simple *past*. He describes a temporal sequence of undetermined alternative possibilities followed by an adequately determined choice where chance is no longer a factor.

James also asked the students to imagine his actions repeated in *exactly the same circumstances*, a condition which is regarded today as one of the great challenges to libertarian free will. In the following passage, James anticipates much of modern philosophical modal reasoning and physical theories of multiple universes.

Imagine that I first walk through Divinity Avenue, and then imagine that the powers governing the universe annihilate ten minutes of time with all that it contained, and set me back at the door of this hall just as I was before the choice was made. Imagine then that, everything else being the same, I now make a different choice and traverse Oxford Street. You, as passive spectators, look on and see the two alternative universes,--one of them with me walking through Divinity Avenue in it, the other with the same me walking through Oxford Street. Now, if you are determinists you believe one of these universes to have been from eternity impossible: you believe it to have been impossible because of the intrinsic irrationality or accidentality somewhere involved in it. But looking outwardly at these universes, can you say which is the impossible and accidental one, and

which the rational and necessary one? I doubt if the most ironclad determinist among you could have the slightest glimmer of light on this point.²³

James's two-stage model effectively separates chance (the indeterministic free element) from choice (an arguably determinate decision that follows causally from one's character, values, and especially feelings and desires at the moment of decision).

Note that compatibilists (James's "soft determinists") should be pleased that the second stage of the model is completely consistent with the compatibilist view that determination is required for free will and inconceivable without it.²⁴

In *The Principles of Psychology*, James asked where the alternative possibilities for action come from? From past experiences, he says, initially involuntary and random. From observing the experiences of others, also the results of chance, we build up a stock of possibilities in our memory.

We learn all our possibilities by the way of experience. When a particular movement, having once occurred in a random, reflex, or involuntary way, has left an image of itself in the memory, then the movement can be desired again, proposed as an end, and deliberately willed.²⁵

*A supply of ideas of the various movements that are possible left in the memory by experiences of their involuntary performance is thus the first prerequisite of the voluntary life.*²⁶ [emphasis in original]

In 1880 James had suggested a strong similarity between genetic evolution and the evolution of ideas.

A remarkable parallel, which I think has never been noticed, obtains between the facts of social evolution on the one hand, and of zoölogical evolution as expounded by Mr. Darwin on the other.²⁷

[In mental evolution], if anywhere, it would seem at first sight as if that school must be right which makes the mind passively plastic, and the environment

actively productive of the form and order of its conceptions...It might, accordingly, seem as if there were no room for any agency other than this...as if, in a word, the parallel with Darwinism might no longer obtain...

But, in spite of all these facts, I have no hesitation whatever in holding firm to the Darwinian distinction even here. I maintain that the facts in question are all drawn from the lower strata of the mind, so to speak.

And I can easily show...that as a matter of fact the new conceptions, emotions, and active tendencies which evolve are originally produced in the shape of random images, fancies, accidental out-births of spontaneous variation in the functional activity of the excessively instable human brain.”²⁸

Thus James sees the origin of new thoughts and actions in the “accidental and spontaneous variations” which put “random images” in the memory, where in a second stage they can be “proposed as an end, and deliberately willed.” Robert J. Richards thinks Darwin himself would not have approved of James’s use of his theory to defend free will. Richards says Darwin “was fully persuaded that human mental behavior was completely determined.”²⁹ Although James could not have known Darwin’s view, since they only appeared in his notebooks.³⁰

THE TEMPORARY ECLIPSE OF WILLIAM JAMES PSYCHOLOGY

Shortly after his death in 1910, the rise of behaviorism in America put most of the work in James’s *Principles of Psychology* off limits. Consciousness, will, feelings, motives, desires, purposes, and plans were all deemed unobservable by the objective, third-party, standards of modern science. Where once introspection was seen as a powerful tool (and it was perhaps James’s most powerful tool), it was now attacked as unverifiable “introspectionism.” The proper study of psychology was now based entirely on external observations of visible behavior. The

mind was now a black box. Consciousness and free will became taboo topics in academic departments.

Even in the 1960's, when cognitive science replaced behaviorism, the new materialist and physicalist models of mind had no place for metaphysical discussions of the mind-body problem. The concept of consciousness was thought too confused to be of any help in models of the mind as a computer.

But the last few decades has seen a resurgence of interest in the thoughts of William James. Bernard Baars, the theoretical neurobiologist and author of the leading textbook on Consciousness³¹ says:

By wide consent the foremost work on human mental processes, even today, is William James's *Principles of Psychology*, which appeared in 1890. The *Principles* offers thirteen hundred pages of inspired dialogue on the major topics of psychology. Building on fifty years of European studies, it has given us classic descriptions of selective attention, mental imagery, hypnosis, habit and effortful concentration, the stream of consciousness, the basic arguments for and against unconscious processes, a theory of voluntary control and impulsiveness, the crucial distinction between self-as-subject and self-as-object, and much more. On many of these topics James's thinking is fully up to date, and it is embarrassing but true that much of the time he is still ahead of the scientific curve. Entire research domains have been inspired by single passages in the *Principles*.³²

Although James discusses free will only briefly in the *Principles*, (pp.569-79), he directed readers to "the grounds of his opinion" in his 1884 lecture on the Dilemma of Determinism referenced above. We hope to show that in that work James was "well ahead of the curve" in providing a limited indeterminism as the source of creative alternative possibilities leading to ambiguous futures.

JOHN LOCKE'S SEPARATION OF FREE FROM WILL

First, we must note that, centuries earlier, John Locke had made a strong case for *separating* the idea of freedom from the determinate will. For Locke and his contemporaries, notions of freedom and liberty were often associated with randomness and libertine chance.

In his *Essay Concerning Human Understanding*, Locke calls the question of Freedom of the Will *unintelligible*. But for Locke, it is only because the adjective "free" applies more properly to the agent, not to the will, which is determined by the mind, and determines the action.

In Book II, Chapter XXI, On Power, section 14, Locke argues,

I leave it to be considered, whether it may not help to put an end to that long agitated, and, I think, unreasonable, because unintelligible question, viz. *Whether man's will be free or no?* For if I mistake not, it follows from what I have said, that the question itself is altogether improper; and it is as insignificant to ask whether man's *will* be free, as to ask whether his sleep be swift, or his virtue square: liberty being as little applicable to the will, as swiftness of motion is to sleep, or squareness to virtue. Every one would laugh at the absurdity of such a question...and when any one well considers it, I think he will as plainly perceive that liberty, which is but a power, belongs only to agents, and cannot be an attribute or modification of the will, which is also but a power.³³

In sections 16 and 18, he elaborates

It is plain then that the will is nothing but one power or ability, and freedom another power or ability - so that, to ask, whether the will has freedom, is to ask whether one power has another power, one ability another ability; a question at first sight too grossly absurd to make a dispute, or need an answer.³⁴

This way of talking, nevertheless, has prevailed, and, as I guess, produced great confusion.³⁵

Locke's warning of confusion in this "way of talking," a popular phrase with analytic language philosophers from Ludwig Wittgenstein to Richard Rorty, might have alerted language philosophers to the proper "dis-solution" of the "pseudo-problem" of free will.³⁶ Simply separate the "free" from the "will!" It's the agent that is free - as a consequence of genuine alternative possibilities to choose from.

In section 21, Locke concludes,

I think the question is not proper, *whether the will be free*, but *whether a man be free*. Thus, I think,

First, that so far as any one can, by the direction or choice of his mind, preferring the existence of any action to the non-existence of that action, and *vice versa*, make it to exist or not exist, so far *he* is free. For if I can, by a thought directing the motion of my finger, make it move when it was at rest, or *vice versa*, it is evident, that in respect of that I am free...and as far as this power reaches, of acting or not acting, by the determination of his own thought preferring either, so far is a man free. For how can we think any one freer, than to have the power to do what he will?... So that in respect of actions within the reach of such a power in him, a man seems as free as it is possible for freedom to make him.³⁷

The two-stage model of James, which also separates "free" from "will," might have pleased Locke, excepting that Locke might not accept chance as the source of possibilities.

THE STANDARD ARGUMENT AGAINST FREE WILL

Perhaps the most important insight in the Jamesian model is that *chance is not the direct cause of action*, that chance does not make the will itself indeterminate. There is in the will adequate determinism, though that does not mean predeterminism. The causal chain of events stops at James generation of ambiguous futures.

The classical argument against free will is to describe the problem logically as the horns of a dilemma, on one side determinism (really predeterminism), on the other side chance, both of which imperil moral responsibility.

Given the stark choice between these exclusive options, it is plain why most philosophers are compatibilists and opt for determinism. Some determinism is necessary for the determination of our actions by our reasons. The idea that our actions are random is patently absurd. James's contemporary John Fiske wrote, "Volitions are either caused or they are not. If they are not caused, an inexorable logic brings us to the absurdities just mentioned. If they are caused, the free-will doctrine is annihilated."³⁸

By limiting chance to the generation of alternative possibilities, James was the first to overcome the standard argument against libertarian free will found in the writings of many of the recent participants in the free will debates.³⁹ Instead of a stark choice between chance and determinism, Jamesian two-stage models involve *both* some chance *and* some limited determinism. Some chance is needed to break the causal chain of strict logical and physical predeterminism. But some determination is also needed to protect the will from the charge that our decisions are random. Decisions must be adequately determined by a process that considers reasons, motives, and feelings when evaluating the alternative possibilities that have been generated in part by chance.

James accomplishes this by using chance simply to create genuinely new and unpredictable alternative possibilities for action, following which a choice can be made by a will that is consistent with character, values, and especially with one's desires and feelings, which James considered an essential part of the will.

THE STRANGE CASE OF R. E. HOBART

R. E. Hobart is the pseudonym of Dickinson S. Miller, a student of William James who was later one of his closest personal friends and for some years a colleague in the Harvard philosophy department. Miller criticized the core idea of *The Will to Believe*, namely that it was

acceptable to hold religious faith in the absence of evidence for or against that faith. James referred to Miller as "my most penetrating critic and intimate enemy."⁴⁰

Nearly twenty-five years after James's death, under the name R. E. Hobart, Miller published a short article in *Mind*⁴¹ in 1934 that is mistakenly considered one of the definitive statements of determinism and compatibilism. Despite being widely cited as showing that free will *requires* determinism,⁴² Hobart explicitly does not endorse strict logical or physical determinism, and he explicitly does endorse the existence of alternative possibilities, which he says can depend on absolute chance. Remember that Hobart is writing about six years after the discovery of quantum indeterminacy. He says:

I am not maintaining that determinism is true...it is not here affirmed that there are no small exceptions, no slight undetermined swervings, no ingredient of absolute chance.⁴³

We say, 'I can will this or I can will that, whichever I choose.' Two courses of action present themselves to my mind. I think of their consequences, I look on this picture and on that, one of them commends itself more than the other, and I will an act that brings it about. I knew that I could choose either. That means that I had the power to choose either.⁴⁴

Note that where Hobart describes alternative possibilities as "presenting themselves" (this was also James's terminology), he attacks raw indeterminism as the direct cause of actions. Thoughts come to us freely, actions come from us willfully.

In proportion as an act of volition starts of itself without cause it is exactly, so far as the freedom of the individual is concerned, as if it had been thrown into his mind from without — 'suggested' to him — by a freakish demon. It is exactly like it in this respect, that in neither case does the volition arise from what the man is, cares for or feels allegiance to; it does not come out of him. In proportion as it is undetermined, it is just as if his legs should suddenly spring up and carry him off where he did not prefer to go. Far from constituting freedom, that would mean, in the exact measure in which it took place, the loss of freedom.⁴⁵

What is strange is that this clear two-stage model following William James's ideas should be so widely and mistakenly regarded as a defense of strict determinism.

LATER TWO-STAGE MODELS

As far as we know, James was the only thinker with a two-stage model for free will in the nineteenth century. While the ancient materialist Epicurus may have had something similar in mind, his writings are not preserved well enough for us to know.

In the twentieth and twenty-first centuries ten more philosophers and scientists, somewhat independent of one another, devised similar two-stage models that separate "free" from "will." Were they aware of James's pioneering view? They all could have read James's famous essay on the subject. And no doubt most were familiar with the landmark Hobart article in *Mind*. We review some of their arguments here as evidence that William James was once again "ahead of the curve" as a thinker on this most ancient of philosophical and psychological problems.

They include the French mathematician and scientist Henri Poincaré (about 1906)⁴⁶, the physicist Arthur Holly Compton (1931, 1955)⁴⁷, the biologist A.O. Gomes (1960)⁴⁸, the philosopher Karl Popper (1965, 1977)⁴⁹, the physicist and philosopher Henry Margenau (1968, 1982)⁵⁰, the philosophers Daniel Dennett (1978)⁵¹, Robert Kane (1984)⁵², John Martin Fischer (1995)⁵³, and Alfred Mele (1995)⁵⁴, the psychologist Stephen Kosslyn (2004)⁵⁵, the astrophysicist and philosopher Bob Doyle (2005)⁵⁶, and most recently, the neurogeneticist Martin Heisenberg (2009)⁵⁷, son of the physicist Werner Heisenberg.

We look briefly at some of the variations and extensions of the Jamesian model that followed the discovery in 1927 of quantum indeterminacy by Werner Heisenberg. Astrophysicist Arthur Stanley Eddington claimed in 1928 that indeterminacy marked the end of strict physical determinism. Writing up his Gifford Lectures of 1927, Eddington announced "It is a consequence of the advent of the quantum theory that *physics is no longer pledged to a scheme of deterministic law.*"⁵⁸ He went even farther and enthusiastically identified indeterminism with

freedom of the will, but Eddington had no specific model. In 1935 he said that determinism has been “expelled from present-day physics,” he declared, so that “it is no longer necessary to suppose that human actions are completely predetermined.”⁵⁹

ARTHUR HOLLY COMPTON (1892-1962)

Compton won the Nobel Prize in Physics in 1927, the year that Werner Heisenberg discovered quantum indeterminacy. In *Science* magazine in 1931, Compton endorsed the idea of human freedom based on quantum indeterminacy. In his article, Compton invented the notion of amplification of microscopic quantum events to bring chance into the macroscopic world. He imagined sticks of dynamite attached to his amplifier, anticipating the Schrodinger's Cat paradox.⁶⁰

Years later, Compton clarified the two-stage nature of his idea – first a range of possibilities then a determining choice.

A set of known physical conditions is not adequate to specify precisely what a forthcoming event will be. These conditions, insofar as they can be known, define instead a range of possible events from among which some particular event will occur. When one exercises freedom, by his act of choice he is himself adding a factor not supplied by the physical conditions and is thus himself determining what will occur. That he does so is known only to the person himself. From the outside one can see in his act only the working of physical law. It is the inner knowledge that he is in fact doing what he intends to do that tells the actor himself that he is free.⁶¹

KARL POPPER (1902-1994)

Compton's work was closely read by philosopher Karl Popper, especially when Popper was selected to give the first Arthur Holly Compton Memorial Lecture in 1965. Popper at times dismissed quantum mechanics as being no help with free will, but in his Compton lecture he describes a two-stage model that parallels Darwinian evolution, with genetic mutations being probabilistic and involving quantum indeterminacy.

Popper criticizes the standard argument that chance and determinism exhaust the possibilities for free will,

The idea that the only alternative to determinism is just sheer chance was taken over by Schlick, together with many of his views on the subject, from Hume, who asserted that 'the removal' of what he called 'physical necessity' must always result in 'the same thing with chance. As objects must either be conjoin'd or not, . . . 'tis impossible to admit of any medium betwixt chance and an absolute necessity.'

"Hume's and Schlick's ontological thesis that there cannot exist anything intermediate between chance and determinism seems to me not only highly dogmatic (not to say doctrinaire) but clearly absurd; and it is understandable only on the assumption that they believed in a complete determinism in which chance has no status except as a symptom of our ignorance."⁶²

Popper called for a combination of randomness and control to explain freedom, though not yet explicitly in two stages with random chance before the controlled decision: "freedom is not just chance but, rather, the result of a subtle interplay between something almost random or haphazard, and something like a restrictive or selective control."⁶³

In his 1977 book with John Eccles, *The Self and its Brain*, Popper finally formulates the two-stage model in a temporal sequence, and makes an explicit comparison with evolution and natural selection,

New ideas have a striking similarity to genetic mutations. Now, let us look for a moment at genetic mutations. Mutations are, it seems, brought about by quantum theoretical indeterminacy (including radiation effects). Accordingly, they are also probabilistic and not in themselves originally selected or adequate, but on them there subsequently operates natural selection which eliminates inappropriate mutations. Now we could conceive of a similar process with respect to new ideas and to free-will decisions, and similar things.

That is to say, a range of possibilities is brought about by a probabilistic and quantum mechanically characterized set of proposals, as it were - of possibilities brought forward by the brain. On these there then operates a kind of selective procedure which eliminates those proposals and those possibilities which are not acceptable to the mind.⁶⁴

In 1977 Popper gave the first Darwin Lecture, at Darwin College, Cambridge. He called it *Natural Selection and the Emergence of Mind*. In it he said he had changed his mind (a rare admission by a philosopher) about two things. First, he now thought that natural selection was not a "tautology" that made it an unfalsifiable theory. Second, he had come to accept the random variation and selection of ideas as a promising model of free will and that indeterminism could help as the source of variation.

The selection of a kind of behavior out of a randomly offered repertoire may be an act of free will. I am an indeterminist; and in discussing indeterminism I have often regretfully pointed out that quantum indeterminacy does not seem to help us; for the amplification of something like, say, radioactive disintegration processes would not lead to human action or even animal action, but only to random movements.

I have changed my mind on this issue. A choice process may be a selection process, and the selection may be from some repertoire of random events, without being random in its turn. This seems to me to offer a promising solution to one of our most vexing problems, and one by downward causation.⁶⁵

DANIEL DENNETT (1942-)

While he remains a confirmed compatibilist, in *On Giving Libertarians What They Say They Want* - Chapter 15 of his 1978 book *Brainstorms*⁶⁶ - Tufts philosopher Daniel Dennett articulated the case for a two-stage model of free will better than any libertarian. Dennett named his model of decision-making "Valerian" after the poet Paul Valery, who took part in a 1936 conference in Paris with Jacques Hadamard. The conference focused on Henri Poincaré's two-

stage approach to problem solving, in which the unconscious generates random combinations. In his book, *The Psychology of Invention in the Mathematical Mind*, Hadamard quoted Valéry⁶⁷ (as did Dennett later), summarizing the conference opinion, “It takes two to invent anything. The one makes up combinations; the other one chooses, recognizes what is important to him in the mass of things which the former has imparted to him.”

Although Valéry describes two persons, this is clearly William James’s temporal sequence of random chance (“free”) followed by a determining choice (“will”). For James, chance and choice are part of a single mind. For this reason and for James priority, we believe the two-stage mind model is better named “Jamesian” free will.

Dennett makes his version of a two-stage model very clear. And he defends it with six excellent reasons that are more persuasive than those of any other philosopher or scientist.

The model of decision making I am proposing has the following feature: when we are faced with an important decision, a consideration-generator⁶⁸ whose output is to some degree undetermined produces a series of considerations, some of which may of course be immediately rejected as irrelevant by the agent (consciously or unconsciously). Those considerations that are selected by the agent as having a more than negligible bearing on the decision then figure in a reasoning process, and if the agent is in the main reasonable, those considerations ultimately serve as predictors and explicators of the agent's final decision.⁶⁹

Dennett then gives six excellent reasons why this is the kind of free will that libertarians say they want. They are stated more clearly and convincingly than any libertarian philosopher and it is surprising that more free will libertarians did not accept this view.

First...The intelligent selection, rejection, and weighing of the considerations that do occur to the subject is a matter of intelligence making the difference...

Second, I think it installs indeterminism in the right place for the libertarian, if there is a right place at all...

Third...from the point of view of biological engineering, it is just more efficient and in the end more rational that decision making should occur in this way...

A fourth observation in favor of the model is that it permits moral education to make a difference, without making all of the difference...

Fifth - and I think this is perhaps the most important thing to be said in favor of this model - it provides some account of our important intuition that we are the authors of our moral decisions...

Finally, the model I propose points to the multiplicity of decisions that encircle our moral decisions and suggests that in many cases our ultimate decision as to which way to act is less important phenomenologically as a contributor to our sense of free will than the prior decisions affecting our deliberation process itself: the decision, for instance, not to consider any further, to terminate deliberation; or the decision to ignore certain lines of inquiry.

These prior and subsidiary decisions contribute, I think, to our sense of ourselves as responsible free agents, roughly in the following way: I am faced with an important decision to make, and after a certain amount of deliberation, I say to myself: "That's enough. I've considered this matter enough and now I'm going to act," in the full knowledge that I could have considered further, in the full knowledge that the eventualities may prove that I decided in error, but with the acceptance of responsibility in any case.⁷⁰

We might add a seventh reason to Dennett's otherwise comprehensive list, that this kind of free will is a process that could have evolved naturally from lower animals. The most recent contributor of a two-stage model establishes that fact.

MARTIN HEISENBERG (1940-)

The most recent thinker to describe a two-stage model is Martin Heisenberg (son of physicist Werner), chair of the University of Wurzburg's BioZentrum genetics and neurobiology section. Since the indeterminacy principle was his father's work, Heisenberg's position that the physical universe is no longer determined and that nature is inherently unpredictable comes as no surprise. What is unusual is that Heisenberg finds evidence of free behavior in animals, including some very simple ones such as *Drosophila*, on which he is a world expert. Heisenberg argues for some randomness even in unicellular bacteria, followed by more lawful behaviors such as moving toward food.

Evidence of randomly generated action — action that is distinct from reaction because it does not depend upon external stimuli — can be found in unicellular organisms. Take the way the bacterium *Escherichia coli* moves. It has a flagellum that can rotate around its longitudinal axis in either direction: one way drives the bacterium forward, the other causes it to tumble at random so that it ends up facing in a new direction ready for the next phase of forward motion. This 'random walk' can be modulated by sensory receptors, enabling the bacterium to find food and the right temperature.⁷¹

In higher organisms, the brain still may include elements that do a random walk among options for action. The capability to generate new and unpredictable behaviors would have great survival value, and would likely be incorporated in higher organisms:

the activation of behavioural modules is based on the interplay between chance and lawfulness in the brain. Insufficiently equipped, insufficiently informed and short of time, animals have to find a module that is adaptive. Their brains, in a kind of random walk, continuously preactivate, discard and reconfigure their options, and evaluate their possible short-term and long-term consequences.

The physiology of how this happens has been little investigated. But there is plenty of evidence that an animal's behaviour cannot be reduced to responses. For example, my lab has demonstrated that fruit flies, in situations they have never encountered, can modify their expectations about the consequences of their actions. They can solve problems that no individual fly in the evolutionary history of the species has solved before. Our experiments show that they actively initiate behaviour.⁷²

Heisenberg's combination of some randomness followed by some "lawful" behavior is the latest version of William James's two-stage model. We now have empirical evidence for behavioral freedom in many animals. James would have been pleased.

Most importantly, Heisenberg's work shows us that human free will may have evolved naturally from the behavioral freedom of the lower animals. Free will is not a gift of God to humanity that marks humans as different from other animals. And it is not a metaphysical mystery that requires an immaterial mind distinct from the human body.⁷³

HOW BEHAVIORAL FREEDOM EVOLVED TO BECOME FREE WILL

Robert J. Richards says that the key to understanding how James applied the Darwinian perspective to the mental realm is to see it as "two different sources: spontaneous variations, which do not mirror their causes; and a selection by external circumstances."⁷⁴ James's two-stage model is clear in his description of "inner" and "outer" steps. Richards says that "James insisted that 'the variation or inner relation does not 'correspond' with its cause...the outward relation has a perfectly definite function: to take the variation once made and preserve or destroy it.'"⁷⁵ So how can James's mental selection process differ from Martin Heisenberg's lawlike selection in lower animals?

We can distinguish four evolutionary levels between the lowest and highest forms of selection. Note that the sources of spontaneous variation are the same on all four levels. They are driven by noise and errors in the biological system, some of which result from quantum indeterminacy.

1. Instinctive selection - for organisms with only genetically inherited behaviors.

2. Learned selection - for organisms that remember their past to guide their future.
3. Predictive selection - for animals with foresight who anticipate consequences.
4. Reflective and normative selection - for humans who can think twice, then think again about the thought, evaluating it in the light of personal and societal values.

In Jamesian two-stage free will, our thoughts *come to us* freely but our actions *go from us* willfully.

CONCLUSION

The great problem of free will, as William James saw it, is not to make it compatible with determinism, but to make it compatible with chance as the source of novelty⁷⁶ and alternative possibilities. James would therefore today be called an “incompatibilist” on free will. But for him free will is incompatible only with *predeterminism*. It is compatible with *determination* of our actions by our reasons, motives, and feelings as made plain by James’s colleague Dickinson Miller and in later two-stage models. This determination requirement is the reason most philosophers are compatibilists today. Many of them might accept James’s free-will model. James could of course not know of quantum indeterminacy, but quantum chance is now irreducibly real. So the problem today for free will is to show that such chance leaves us with an adequate determinism. It was the fantastic accuracy of Newtonian classical physics predictions that led us in the first place to the illusion of strict causal determinism. Quantum mechanics is even more accurate than classical mechanics. Whether in planets orbiting the sun, or nerve cells firing to move our hands, quantum randomness is for the most part negligible in the macroscopic universe.

We therefore can, as did James, admit some indeterminism. We need not permit it to make our actions and decisions random events, as some determinists and compatibilists mistakenly fear. We must also limit determinism, but not eliminate it, as libertarians mistakenly think necessary. Our decisions must be adequately determined following evaluation of

alternative possibilities provided in part by chance. The Jamesian two-stage model for free will, a combination of chance and adequate determination, is the leading contender for a resolution of the ancient problem of libertarian free will.

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NOTES

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¹⁵ Ibid., p.150.

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