

What is a choice? Choice or the illusion of choice? Should we care?

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Comments hoped for

Abstract: Economists assert that people make choices without thinking much about the distinction between behavior and choice (a chosen behavior). Whether people do, or do not, make choices comes down to how choice is defined; philosophers grapple with this, and the related concept of free will. While the economic theory of behavior is called choice theory, the theory does not admit choices in the street-sense of the word, but in a weaker sense. But, at the same time, we all experience conscious choosing and believe this experience determines which alternative we then select, but mounting evidence suggests that most, or all, of what we do is set by unconscious processes before any conscious experience of choosing occurs. The paper surveys the neurological evidence, after first defining and discussing notions of choice and free will, and their implications for neoclassical choice theory (CT).

Keywords: behavior, the experience of choosing, choice, the illusion of choice, causal determinism, deterministic (in)compatibilism, free will, choice theory, action potentials, neuroscience, experimental philosophy, and Benjamin Libet.

How would you define a *choice*? And the difference between a choice and the experience/sense of making a choice

A choice is difficult to define, particularly if you feel compelled, as you must, to not use the word "choice" to define a choice.

Some necessary conditions for a situation to be a choice?

(1) You are faced with N alternatives (N at least two). (2) You can and must experience only one of the alternatives. (3) You can influence which alternative is experienced. And (4), you are not constrained to experience a specific alternative. Making this last point more explicit, many would say you only have a choice if you were free to experience an alternative different from the one you experienced. While the guy-on-the-street would not, unprompted, list these requirements for a choice, upon reflection he would likely agree with them, but not everyone would (including most economists), particularly if we get more specific about what (3) and (4) mean.

Does choice require a conscious experience of choosing; that is, have you made a choice only if you feel you made a choice?

And, if so, what brings about your sense that you influenced which alternative was realized. You often experience the need to make a choice and then consciously decide on an alternative, and then experience that alternative, giving you the sense that you made the choice. But can you make a choice without consciously feeling that you have made a choice? And, can you not make a choice but feel that you have? The evidence on these two questions, presented in the last section, helps to illuminate why we perceive some of our actions as choices, and some not.

Contrary to what economists believe and teach, the assumptions of CT seem to make choice impossible?

Economists assert that people make choices

But, economists appear to contradict themselves when they assert this; the ability to make choices is, arguably, inconsistent with the assumptions of CT. In explanation, if you are constrained to consume a bundle in your feasible set, if you are constrained to consume the highest-ranked bundle in your feasible set, and if your ranking of bundles is exogenous in that

you cannot change it in the decision/consumption period, there seems to be no real choice. You must select the highest-ranked bundle in your set;¹ behavior is axiomatically determined.

Of course, whether there is choice in CT comes down to how choice is defined; but if you were constrained to select the bundle you selected, the guy-on-the-street would say there was no choice—his definition is a folk definition of choice. So, when economists say that people make choices, they must mean something different from what the guy-on-the-street thinks of as a choice.

Economists need to define choice in a way that makes choice compatible with the assumptions of their theory of behavior (or drop the word “choice”)

Economists would say you have no choice if there is only one alternative in your feasible set ($N=1$), implying that more than one alternative is a necessary condition of choice. But is it also a sufficient condition? That is, do you have economic choice if **external** constraints do not limit you to a specific bundle? Economists must think so, because it called “CT” even though internal constraints (an exogenous ranking and the requirement to experience the highest-ranked feasible bundle) constrain you and economicus to experience a specific bundle. Looking ahead, economists define choice as situations where external constraints do not limit you to a specific bundle. This is the same definition compatibilistic philosophers use to make choice (free will in a weak sense) possible in a deterministic world.²

So, what is *free will* and how does it relate to a capacity to make choices? ⁱ

Isabel Archer is on her way to Italy to pursue her destiny and is explaining to her suitor, Caspar Goodwood, her aversion to his suiting.

Isabel: *If there's a thing in the world I'm fond of it's my personal independence... [I want] To put as many hundred miles of sea between us as possible.*

Casper: *One would think you were going to commit some atrocity!*

Isabel: *Perhaps I am. I wish to be free even to do that, if the fancy takes me.* (The Portrait of a lady, [Henry James 1917](#))

¹ Maybe at some point in the past you had some influence on your current ranking. But even if this is the case, in the present you are constrained to consume your highest-ranked feasible bundle.

² By this definition, other animals also make choices whenever their behavior is not completely determined by external constraints: when there is both dry food and fresh meat in his bowl, my dog always eats the meat first but this is not dictated by external constraints, so he exhibits weak free-will.

Isabel wants to be free to choose to commit one or more atrocities, but only if she fancies it to so choose. Is Isabel free to will and choose?

I have used the term *free will* without defining it, which has been convenient given there is much disagreement as to what it means. The [Stanford Encyclopedia of Philosophy](#) defines free will as a capacity “to choose a course of action from among various alternatives.” Note the words “capacity” and “choice”. If you have free will, somewhere in your head are spirits or networks of neurons that give you the capacity to choose.

Consider the word “will” by itself, and what it means to say, for example, “I will that Event A happens.” (This is an archaic use of the word *will* and makes me think of God.) This could be interpreted as I choose Event A over the other alternatives. Or, if A is a behavior, I am inclined to adopt it. It could also be interpreted as I prefer A, and because I prefer it, I choose it. *Choosing*, *willing*, and *preferring* seem to be close synonyms. So, put simply, free will is philosophical-speak for *the capacity to freely choose*, and the capacity to freely choose is economic-speak for free will.

Of course, there is still the issue of what *free* means. For example, [Immanuel Kant](#) (1724-1804) thought that if you are required to be rational, and if being rational determines what you will do, then you do not have free will—this is akin to the argument I put forward above for why CT is incompatible with choice. So, for Kant an economicus would have free will only if he can choose whether to follow the assumptions of CT, but not if the assumptions are an immutable part of his nature. For example, if you could choose to adopt the rule that you will select your highest-ranked bundle, you could have chosen not to adopt it, so would be free to not choose your highest-ranked feasible bundle.

Doubts about free will go way backⁱⁱ

*Men are mistaken in thinking themselves free; their opinion is made up of consciousness of their own actions, and ignorance of the causes by which they are conditioned. Their idea of freedom, therefore, is simply their ignorance of any cause for their actions. As for saying that human actions depend on the will, this is a mere phrase without any idea to correspond thereto. (Spinoza, *The Ethics Part II: Of the Nature and Origin of the Mind* (partially quoted by [Daniel Wegner](#) (1948-2013)))*

All theory is against the freedom of the will; all experience is for it. ([James Boswell](#) 1791, *The Life of Samuel Johnson* (as quoted by Wegner)³)

[Thomas Hobbs](#) (1588-1679) and [John Locke](#) (1632-1704) also rejected the idea that your will could be free. The philosopher [Jennifer Uleman](#) nicely summarizes some of the different takes on free will. Quoting her, Thomas Hobbs "denies that will can be free at all, arguing that only bodies can be free, or unfree, where free [bodies] just means unimpeded." (*Unimpeded* means unconstrained, as in rich peoples' bodies are less impeded than those of poor people, and prisoners and cripples are impeded more than most.) Locke "concluded that human will is never free, but is always determined by nature or reason: for Locke, 'free will' is a nonsensical thing."

In contrast, [Rene Descartes](#) (1596-1650) understands freedom of the will as "a mental ability to endorse and set oneself on a course of action (or more simply, to assent to something, or not), rather than as a function of the grounds determining action or assent." That is, for Descartes you can will (choose) whatever you want, but that does not mean you determined what you would will (would choose) or that what you willed (you chose) will occur. In Descartes' view, no one will stop me from willing that A will happen but that I willed A, rather than B, was not determined by me, and willing it does not mean it is going to happen. Descartes' free will is limited free will, at best.

In contrast, For Kant, the *will* (not necessarily free) is a real thing that resides in each non-crazy adult human. It is the place or process in your mind that chooses an alternative and that then causes you to do what it takes to experience that alternative; it is the "choosing center"—willing is choosing. (economicus has a choosing center.) Quoting Uleman,

A will is free, for Kant, if it determines itself and is not determined by anything else. A will will be free, in other words, if it chooses ends, and pursues courses of action aimed at realizing those ends, on grounds that are its own, and not on grounds given to it by something or someone external to it.

For Kant, Kantian free will is a possibility, but only for humans and, having your Kantian-will *free* is not guaranteed.⁴

³ Boswell is best known for his biography of his friend, the English man of letters, Samuel Johnson; it is considered one of the greatest biographies in the English language. Boswell knew and admired Rousseau; he had a brief affair with Rousseau's partner—one of Boswell's many affairs.

⁴ Kant relied on *Dualism* to argue that will can be free (Uleman). It is a difficult argument. Kant viewed the body as a physical thing controlled by the laws of physics, and believed that if what you will is determined by the laws of physics—what you will is not freely willed. He also believed that if what you will is constrained by reason, you do not freely will. These two beliefs of

Modern definitions of free will fall along a continuumⁱⁱⁱ

At one extreme, for free will,

One wants to be what tradition has it that Eve was when she bit the apple. Perfectly free to do otherwise. So perfectly free, in fact, that even God couldn't tell which way she'd jump. (Jerry Fodor (2003) philosopher and cognitive scientist))

Fodor is providing one definition, not arguing that we have free will in this sense. At the other extreme, you have free will if another agent is not controlling you, and, in addition, other agents, excluding God, cannot predict with certainty what you will do before you do it. At this other extreme, you lack free will only if a mad scientist, or puppeteer, or God pulls your strings. You lack control in this sense if your behavior is effectively determined by your external constraints (people in prison, for example, cannot choose to spend the night in their cell).⁵ Or if you're hallucinating because of drugs or a brain tumor. This is how the philosopher [Daniel Dennett](#) defines free will. Let's call this *weak free-will*: free will in a weak sense. His definition is close to the legal definition, as in you signed the contract of your "own free will" if you were not "under duress or under the influence of hallucination or other mental derangement." Dennett says that his view of free will

... is probably the consensus not only among philosophers but also among judges, lawyers, and others who have to make distinctions about who is responsible for what and who is excused because they do not free will when they acted.

In between these two extremes, but closer to the first, is that free will is the ability, before the choice is made, to choose differently than you chose. You chose *A* but could have chosen *B* (you could have behaved differently than you behaved). And you have this ability even if God—assuming you believe in God—knew which one you were going to choose. Let's refer to this as *strong free-will*, free will in a strong sense. Dennett does not believe we have free will in this sense, but also thinks this definition of free will is "bonkers". Again, quoting Dennett,

People care deeply about having free will, but they also seem to have misguided ideas about what free will is or could be ... Our decisions are not little miracles in the brain that violate the physics and chemistry that account for the rest of our bodies' processes, even if many folk think this must be what happens if our decisions are to be truly

Kant argue against the existence of a will that is free. But these arguments are materialist in perspective. Kant got his will freed by assuming that will is not something subject to reason or the laws of physics; it is a spiritual thing. An analogy is God's Will which is not subject to anything earthly; otherwise it would not be God's Will.

⁵ I wonder if advocates of this view of free will (free will in the weak sense) believe rich people have more free-will than poor people because the rich are less financially constrained.

free. We can't conclude from this, however, that then we don't have free will, because free will in this bonkers sense is not the only concept of free will.

Fodor assessment of Dennett's definition of free will is

There's the lurking sense that what you got isn't quite what you ordered, and half an hour later you're hungry again.

In Fodor's view, Dennett has simply called what we can do "free will"—a bait and switch, a bait and switch because, in Fodor's view, what Dennett calls free will, most people would not call free will.

Why do we all feel and believe that we have free will and make choices?

While we understand that some of our actions are taken unconsciously—most of us feel that most of what we do happens because we consciously, and freely, decided to behave that way; that is, most of us believe we have free will—that we *will—freely*—most of our actions.

Two reasons to believe we have free will and make choices:

Reason 1: because we do have free will and do make choices. Most of us believe this is the correct answer. We consciously choose an Egg McMuffin rather than a yogurt for breakfast, and this conscious choosing is why we are consuming animal fat rather than vegetable fat. But—another possible reason (Reason 2) is evolution has kluged us: left us with a flawed notion of causality, causing us to incorrectly assume that the conscious experience of making a choice is what led us to take a particular action.

A bit on causality and logic

Consider two events (I and II) where Event II always happens right after Event I occurred, and Event II never occurs unless Event I precedes it. We tend to conclude that Event I caused Event II because often it has—evolution has caused us to think this way; its objective is not to produce animals that are perfectly rational and logical, only animals that get it right enough of the time. The sun rises in New York City (I) before it rises in Chicago (II), but that does mean the sunrise in NYC caused the sunrise in Chicago. They are both caused by Events III and IV, the motions of the sun and earth.

The illogic is *necessary* is confused with *sufficient*. If Event II occurs only when Event I occurs first, then Event I is necessary for Event II (without I there can be no II). But Event I being necessary does not mean Event I is sufficient to cause Event II. (If it were sufficient, then

the occurrence of Event I, by itself, would guarantee that II happens.) Two examples: a necessary condition for being Bob the Bear is that you are a bear, but being a bear is not sufficient to make you Bob the Bear. And, the sun rising in NYC is a necessary condition for it to rise in Chicago.

The two Events of interest in terms of choice are *having the conscious experience of deciding to do something* (Event I), and *doing what was consciously decided* (Event II). Examples of I are I consciously choosing to drink a Coke, and consciously deciding to marry Wanda. Event II is the actual drinking or marrying. That Event I precedes II does not mean it caused II. George only married Wanda after he had the experience of deciding to marry her, but maybe what caused George to marry Wanda was a third event in their past (an event involving a slinky red dress) that is no longer in his conscious memory, or maybe he forget that is was Wanda's idea. The possibility that Event I did not cause Event II is a hard thing to get your head around when it seems obvious that it did, and, in addition you really want to believe it did. You want to believe that first consciously deciding to buy a new car was what caused you to buy it.

The next two sections present the evidence on conscious choice and also takes up the issue of why we might have the experience of conscious choosing if it does not influence what we subsequently do. First, I consider the question of whether choice is possible in a deterministic world.

Is choice (and economic choice) compatible with *causal determinism*?

Thinking about causal determinism and its implications for CT informs on what it means to make a choice and whether people are responsible for their choices (both critical ethical issues), but be warned that thinking about causal determinism and choice can be crazy-making.

Causal determinism^{iv}

It is the hypothesis that your actions are completely determined by the laws of nature and what has come before (your genetics, your history, the current state-of-the world)—your actions are **caused**. Causal determinism is taken as fact by many (but not all) scientists and philosophers, but mostly rejected out-of-hand by the guy-on-the-street, especially if anyone suggests it applies to humans.

In addition, many physicists and neuroscientists are *incompatibilists* (believe causal determinism is incompatible with free will and choice). But, many philosophers are *compatibilists*, believing causal determinism is consistent with free will and choice. Economists tend to be implicit, and unaware, *compatibilists*.

The deterministic hypothesis is that with complete information and the ability to process it I could predict everything you will do—all acts are causal and deterministic.^{6 7} (Some use the term *mechanical determinism*.) It follows from classical, deterministic physics. The opposite is *indeterminism*. Most neuroscientists and physicists are either determinists, or, if indeterminists, indeterminists only because they believe behavior has a random component. Modern physicists accept some theory of quantum mechanics which adds a random component at the subatomic level, but no one knows whether it affects the behaviors of individuals. There is also some disagreement about whether it is even possible to determine whether the world is, or is not, deterministic.

The determinism argument is we are mechanical/chemical/electrical creatures whose lives and behaviors must follow the deterministic laws of physics. A brain, human or otherwise, is simply a bunch of complicated physical grey and white matter with a lot of chemical and electrical things going on —too complicated for us to, yet, comprehend. And, our brain/body state at each moment in time, and the physical state of the world at that moment completely determines how we act, more precisely react.

Historically, many philosophers and mathematicians were determinists, including Locke, Baruch Spinoza, [Gottfried Leibniz](#) (1646-1716), Hume, and the mathematician [Pierre-Simon Laplace](#) (1749-1872). In 1814 Laplace articulated determinism in terms of an intellect (demon) who could predict all future action.

In Laplace's story, a sufficiently bright demon who knew how things stood in the world 100 years before my birth could predict every action, every emotion, every belief in the course of my life. Were she then to watch me live through it, she might smile condescendingly, as one who watches a marionette dance to the tugs of strings that it knows nothing about. We can't stand the thought that we are (in some sense) marionettes. Nor does it matter

⁶Causal determinism is different from fate and predestination. Fate and predestination, like causal determinism, imply something is going to happen, but the reason it is going to happen is spiritual rather than the result of physics. An act that is predestined is freely chosen but God knows what you will choose.

⁷ This doesn't mean that everything can be predicted: currently there isn't enough potential computing power, and many doubt whether there ever could be enough.

whether any demon (or even God) can, or cares to, actually predict what we will do: the existence of the strings of physical necessity, linked to far-past states of the world and determining our current every move, is what alarms us. (SEP on Causal Determinism)

Notable historical indeterminists include [George Berkeley](#) (1685-1753), Descartes, Kant, and [Jean Jacques Rousseau](#) (1712-78). For Berkeley, Descartes, and Kant their arguments for indeterminism are all based on their belief in dualism (your mind more than you brain)—Rousseau's argument is not.

Is choice consistent with causal determinism? *Compatibilists and Incompatibilists*^v

There are numerous schools of thought on determinism and choice, varying on whether you believe in determinism and whether you believe choice is consistent with determinism. Behavior having a random component is a way to generate indeterminism, but adding a random component to a person's behavior doesn't mean they are making choices—choosing freely isn't the same thing as behaving randomly.

Many neuroscientists and physicists are incompatibilists, rejecting free will and choice

As noted above, they are either determinists, or if indeterminists, indeterminists only because they believe behavior has a random component. And most don't believe free will is consistent with either, if free will is the ability to behave differently than you behaved. [The philosopher Daniel Dennett, a champion of compatibilism, lists the following as distinguished members of the *choice is illusion* camp (incompatibilists): the physicists Albert Einstein and Stephen Hawking, the neuroscientists [Wolf Singer](#), [Chris Frith](#), and [Patrick Haggard](#), and the psychologists [Paul Bloom](#) and Daniel Wegner.]

What are philosophers? A lot of them are deterministic compatibilists

According to Dennett, a compatibilist, and the incompatibilist philosopher [Shaun Nichols](#), a lot (the majority?) of professional philosophers are compatibilists, including the determinists Hobbes, Locke, Leibniz and Hume. Hume even argues determinism is required for free will. Most compatibilists are determinists, but some noted determinist philosophers are not compatibilists.⁸

⁸ These include Spinoza, and the enlightenment thinkers [Paul-Henri D'Holbach](#) (1723-1789), [Denis Diderot](#) (1713-84), and [Voltaire](#) (1694-1778). In addition, there are a few indeterminant philosophers who argue free will could exist even if the world were deterministic, but most who argue the world is indeterminant think determinism is inconsistent with free will.

Why are there deterministic compatibilists? Cynically, according to Nichols,

Many of us Incompatibilists think we know the answer to this: it's wishful thinking! Philosophers embrace compatibilism because they want it to be true. This view is, I think, common among Incompatibilists. Famously, James dubs compatibilism a "quagmire of evasion." Even more famously, Kant says it is a "wretched subterfuge." We can put the incompatibilists' motivational hypothesis somewhat more precisely as follows: Philosophers embrace compatibilism despite its counter-intuitiveness because compatibilism is motivationally attractive.

Maybe so, but Hume's classic defense of compatibilism does not come across as wishful thinking. Hume starts by noting that everything has a cause (a earthquake has a cause, and you buying vanilla ice cream instead of strawberry has a cause), so if free will is when behavior is not caused, free will is impossible. Rejecting free will in this sense, he says you have free will when your behavior is not *compelled*, defining compelled behavior as behavior completely determined by exogenous forces. This is the definition adopted by Dennett and is the economic definition of choice, but using different words. What I am calling *weak free will*. Hume's analogy: imagine a slope with rocks lined up in a row from the top to the bottom, with the shape and size of the bottom rock representing you and what is in your head (your internal constraints). Determinism is a causal chain of events starting with the top rock rolling into the second, causing it to move and roll into the third, causing it to, until a rock rolls into you. If the size and speed of rock that hits you is sufficient to completely determine where you will end up, your behavior is compelled and you did not choose where to roll. However, if which way you roll is determined, in part, by your shape and size, you (the rock) have free will and some choice as to where to roll. While a picturesque physics-in-motion analogy, it means big rocks that did not move when they were rolled into exercised free will (chose not to move).

In summary, many philosophers believe in determinism, and most of them believe determinism is compatible with free will, given that they define it in the weak sense. An exception is the economist/philosopher [Christian List](#) (2014) who argues that determinism is compatible with free will in the strong sense (the ability to behave different than you did.)⁹

⁹ List's argument turns on how one interprets "for someone's action to count as free is that the agent can do otherwise." List provides three possible interpretations from the philosophical literature: (1) "If the agent were to try (or choose) to do otherwise, he or she would succeed in doing otherwise", (2) "The agent has the disposition to do otherwise when, in appropriate circumstances (to be spelt out further), he or she tries to do otherwise, and (3) "It is possible (in a sense to be spelt out further) for the agent to do otherwise." He then argues that (1) and (2) are consistent with determinism. While I am somewhat confused, (1) seems consistent with determinism in that while you must choose as you choose given the determinants of the moment, if you were to choose to do otherwise

So, what do regular people believe?

Humans tend to believe causal determinism doesn't apply to humans

Until recently this conjecture was untested. Nichols and [Joshua Knobe](#) work in the emerging field of experimental philosophy, so surveyed people on whether the world is deterministic.¹⁰ Quoting Nichols in 2004:

In a set of experiments exploring the lay understanding of choice, both children and adults tended to treat moral choices as indeterminant. Participants were presented with cases of moral choice events (e.g., a girl steals a candy bar) and physical events (e.g., a pot of water comes to a boil), and they were asked whether, if everything in the world was the same right up until the event occurred, the event had to occur. Both children and adults were more likely to say that the physical event had to occur than that the moral choice event had to occur. This result seems to vindicate the traditional claim that ordinary people in our culture believe that at least some human decisions are not determined.

Humans tend to reject determinism when it comes to human behavior because determinism conflicts with our sense of self—your sense of self is diminished if you think your behavior is set. We have two views of how the world works: a mechanical view that applies to the behaviors of rocks, dogs, and all other non-human plants and animals, and a spiritual view that applies to people, spiritual because the laws of physics are transcended—the mind is more than your brain—the dualist view. Rejecting determinism make it easier to believe humans consciously set their course. People readily believe the behavior of lesser animals is deterministic (or random), that lesser animals are driven by instinct and stimulus so don't make choices in the sense people make choices.

Do regular people think choice is consistent with causal determinism?

Nichols and Knobe addressed this question in a 2007 experiment. They started by asking college students to imagine two different universes.

Imagine a universe (Universe A) in which everything that happens is completely caused by what happened before it. This is true from the very beginning of the universe, so what happened in the beginning of the universe caused what happened next, and so on right up until the present...

Now imagine a universe (Universe B) in which almost everything that happens is completely caused by whatever happened before it. The one exception is human decision making...

(because the world was different deterministically) you would be successful. To buy the argument, you have buy either (1) or (2) as the correct definition of being able to do otherwise.

¹⁰ You can listen to Knobe discuss experimental philosophy at *Philosophy Bites* at <http://philosophybites.com/2010/08/joshua-knobe-on-experimental-philosophy.html>

Ninety percent of the respondents thought our world was more like B than A, consistent with Nichols' earlier finding that people tend to be indeterminists when it comes to the behavior of people, but determinists when it comes to dogs, cats, and rocks.

Everyone was then asked either:

In Universe A, is it possible for a person to be fully morally responsible for their actions? Yes or No?

Or

In Universe A, a man named Bill has become attracted to his secretary, and he decides that the only way to be with her is to kill his wife and 3 children. He knows that it is impossible to escape from his house in the event of a fire. Before he leaves on a business trip, he sets up a device in his basement that burns down the house and kills his family. Is Bill fully morally responsible for killing his wife and children? Yes or No?

These two questions, both about Universe A, were asked because many people believe you are not responsible for actions you did not choose. 72% answered yes to the second question (Bill is responsible), 14% answered yes to the first question, quite a difference.

At this point the authors were concerned that they couldn't determine whether the difference in yes responses was caused by the abstractness of the first universe compared to the concreteness of the second, or caused by the second, but not the first, viscerally affecting the respondent. So, they did a second experiment with each subject asked one of two questions, Half of the people who got each question were told to answer assuming Universe A, half Universe B.

As he has done many times in the past, Mark arranges to cheat on his taxes. Is it possible that Mark is fully responsible for cheating on his taxes? Yes or No?

Or

As he has done many times in the past, Mark stalks and rapes a stranger. Is it possible that Mark is fully responsible for raping the stranger? Yes or No?

Both acts are concretely described but the second generates a negative visceral response. For those told to assume Universe B (the indeterminant universe) most answered yes, finding both the rapist and tax cheater responsible. For those told to assume Universe A (the deterministic world), most asked about the tax cheater answered No (not fully responsible) and most asked about the rapist answered Yes (responsible).

Summarizing, people tend to judge a deterministic act as consistent with free will (so attribute moral responsibility to the act) if the act is explicitly negative, is concretely described, was performed by a human, and makes them viscerally upset—but not when the nature of the act

and actor is unspecified.¹¹ This result has been replicated in non-western populations. We are of two minds when it comes to the question of whether free will is consistent with determinism, a logical mind that concludes the deterministic actor is not responsible, and an emotional mind that concludes they are.

So, what do economists believe?

While they might not articulate it, they are deterministic compatibilists if they believe that choice is consistent with the assumptions of CT, since CT makes choice (free will) deterministic.

The next, and last, section reviews recent neurological and psychological evidence on choice and free will. More and more, the evidence suggests most, or all, of our behaviors are determined in the unconscious parts of our brain, and our conscious brain, later, but before the behavior occurs, sometimes has an *experience of choosing*. Our conscious brain, by consciously willing the action, tricks us into thinking this caused the action. However, this does not mean conscious thought plays no role: those conscious thought can affect the unconscious, so influence future behaviors.

The evidence on conscious choice

The neurological evidence:^{vi}

An increasing number of studies indicate that before you consciously decide on an action, activity in your brain can be measured that predicts the action, brain activity you are unaware of. Call this brain activity Event I: Event I predicts both Event III (the act) and, if it occurs, Event II (conscious choosing, the willing of the act). These findings support the contention that your unconscious initiates the act and then before the action occurs, you consciously "decide" to do it. Paraphrasing the Harvard psychologist [Daniel Wegner](#), choosing is an experience, not a cause.¹²

¹¹ "Indeed, concrete cases of bad behavior lead people to attribute responsibility, even when the action is caused by a neurological disorder." (Nichols 2011)

¹² What he actually said was "...conscious will is an experience, not a cause."

The Libet experiment



Figure 24: Benjamin Libet -1916-1997

Imagine you are a subject in the following experiment. You enter a small room and sit at a desk comfortably resting your left arm on the desk. On the wall in front of you is the face of a large 60-second stopwatch with an illuminated dot traveling around its circumference. The stopwatch has the seconds marked in five second intervals (0, 5 sec. 10 sec., etc. up to 55 sec.). You notice it moves much faster than a normal stop watch. While you do not know its exact speed, the dot covers the 60 stopwatch seconds in 2.6 real seconds. That is, it takes the dot .43 seconds (430 msec.) to go from 0 to 10 and 1.3 seconds (1300 msec.) to go from 0 to 30. So, if you tell someone where the dot was when an event occurs (e.g. when your hand is touched), they can determine when you think the event happened.¹³

A research assistant attaches you to two sets of electrodes. The first set is attached to your left wrist. It will record if-and-when you flick your wrist (when your wrist-flexing muscle contracts). The second set is attached to your scalp, recording if-and-when a certain negatively charged pulse occurs at the top of your brain. You are told to sit there for a few minutes and, if you want, sometimes flick your wrist. Whether and how often you flick is completely up to you. You are asked to remember the position of the dot if-and-when you decide to flick.

This is a stylized description of a famous experiment on consciousness and choice; it was conducted in 1983 by the University of San Francisco neuroscientist Benjamin Libet. The results: Approximately a half second (500 msec.) before your wrist muscle contracts, the electrode on your scalp records the start of a negatively charged pulse (a *readiness potential*).

¹³ Testing dot time: dot time for an unseen stimulus to a subject's hand (a light touch) is only about 50 msec. after the touch, so the sensory lag is small, measurable, and can be accounted for.

That is, this neural activity, which you are not aware of, precedes and predicts you will flick your wrist a half second before you flick it. It is called a readiness potential because your unconscious is getting ready to cause your wrist muscle to contract.¹⁴ [Note the experiment does not demonstrate that the readiness potential causes your wrist to flick—some even earlier neurological event might have caused it—more on this later]

The question is at what point do you consciously decide (choose) to flick your wrist? Based on where the dot was when you decided to flick, this happens, on average, approximately 200 msec. before the muscle contracts, indicating the flick is initiated by your subconscious at least 300 msec. before you consciously “decide” to flick. WOW, but with caution.

Interpret this result carefully. It indicates your unconscious indicated (chose?) when you would flick your wrist, and implies your conscious choice to flick is not what caused the flick. Questions ever since the experiment include: (1) Does the experiment truly indicate your unconscious caused your wrist to flick, and indicate your conscious decision to flick was not the cause? It seems to. (2) If yes, does the result hold for more complex decisions (e.g. proposing to Wanda)? This is hard to test (see [Lady Ottoline Morrell](#), discussed below). (3) And does it mean consciously choosing an action is not what makes that action occur? It seems to.

A readiness potential does not precede every action; it only precedes voluntary actions. [A readiness potential does not precede reflex actions, or other uncontrolled actions. For example, as Libet pointed out, when people with Tourette’s syndrome involuntarily swear, the swearing is not preceded by a readiness potential, but their voluntary actions are preceded by readiness potentials.] So, a readiness potential is not necessary for an action to occur because all actions are not preceded by readiness potentials, but they are necessary and sufficient for voluntary actions.

Many neuroscientists and philosophers have questioned whether the experiment really demonstrates what it suggests.¹⁵ There are reasonable answers supporting the Libet finding, but

¹⁴ Quoting Libet, in 1965, Kornhuber and Deecke “found that a recordable electrical charge in brain activity regularly and specifically preceded a voluntary act... a slow rise in electrical negativity ... The electrical charge started about 800 msec. or more before a subject performed an apparently voluntary act... the readiness potential (RP) or in German, the *bereitschaftspotential*.”

¹⁵ For example, how can the researcher be sure he has correctly measured when you decided to flick your wrist? The lag between when the readiness potential starts and the dot time of deciding could be measurement error caused by the time it takes to turn one’s attention from deciding to observing the position of the dot.

these answers are not bombproof. However, the fundamental finding that the occurrence of an act can be predicted based on unconscious brain activity before you consciously decide to act has been replicated multiple times. In 2007, [John-Dylan Haynes](#), a neuroscientist in Berlin, found, using fMRI imaging, the researcher could predict, with 60% accuracy, whether you will push a left or right button as much as 7 seconds before you push it, and 6 seconds before you “chose” which button to push. Quoting [Kerri Smith](#), the Podcast Editor for the journal *Nature*, talking about a 2011 study:

Some researchers have literally gone deeper into the brain. One of those is [Itzhak Fried](#), a neuroscientist and surgeon at the University of California, Los Angeles, and the Tel Aviv Medical Center in Israel. He studied individuals with electrodes implanted in their brains as part of a surgical procedure to treat epilepsy. Recording from single neurons in this way gives scientists a much more precise picture of brain activity than fMRI or EEG. Fried's experiments showed that there was activity in individual neurons of particular brain areas about a second and a half before the subject made a conscious decision to press a button. With about 700 milliseconds to go, the researchers could predict the timing of that decision with more than 80% accuracy. ‘At some point, things that are predetermined are admitted into consciousness,’ says Fried. The conscious will might be added on to a decision at a later stage, he suggests.

Additional support for the role of the unconscious in behavior is recent research that indicates that your brain can both formulate a goal (e.g. get you invited to a party), and cause you to take actions to achieve that goal, without you being aware of the goal or why you are taking these actions; that is, both are unconscious. Distinguishing between goals and actions/behavior, a goal often motivates actions (choosing to lose weight is a goal, skipping dessert is an action). In a 2010 *Science* article, [Ruud Custers](#) and [Henk Aarts](#) summarize and interpret this recent research on unconscious goal-formation. The previous view, and what most of us want to believe, is that goals are consciously chosen. For example, my goal to write this paper must have been consciously adopted. But, it seems that this does not have to be the case. Summarizing, you can be subliminally motivated to adopt a goal and then unconsciously take actions to achieve it. For example, in a lab the goal is brought to the attention of your unconscious subliminally or, outside the lab, by environmental cues that you are not aware of.¹⁶ You then unconsciously evaluate the rewards associated with that goal (in the lab with a subliminal reward cue, or

¹⁶ People speak more softly when seeing a picture of a library, are more likely to clean their table if there is vague whiff of cleaner in the air, and get more competitive when they enter an office if there is a leather briefcase on the desk (Henk Aarts and Ap Dijksterhuis (2003), Holland et al (2005), and Kay et al. (2004))

because you already unconsciously associate that goal with a reward). Then, depending on how your unconscious assesses the magnitude of the associated reward, you adopt the goal and take actions to achieve it.¹⁷

Despite such findings, most people believe consciously choosing is what causes you to perform an action or adopt a goal.¹⁸

So, does the Libet and related findings imply that conscious thought, including conscious choosing, has no effect on behavior?

No. Even if your unconscious is the determining step before an action is taken, it leaves open the possibility that earlier (right before, or much earlier) conscious thinking influences what you do.¹⁹ For example, in a current choice situation—before your unconscious decides what to do and your conscious brain then experiences conscious choosing—consciously weighing the alternatives could influence what your unconscious decides. Or, the process of conscious choosing—after your unconscious has decided, while not affecting whether you now go with A or B in the current choice set—might influence what the unconscious will choose in future choice sets. Or, thinking about what you had for dinner last night, can influence what your unconscious chooses to cook tonight. Supporting the conjecture that conscious thought has influence, in a 2011 survey article, [Roy Baumeister](#), [E.J. Masicampo](#) and [Kathleen Vohs](#) argue that “The evidence for conscious causation of behavior is ...empirically strong. However, conscious causation is often indirect and delayed, and it depends on the interplay with unconscious processes.”²⁰

¹⁷ For example, in one study they review, students were seated “in front of a computer, allegedly to test their computer-mouse skills. Before starting on this test, some participants were subliminally exposed to words related to the goal of socializing, whereas others were exposed to words unrelated to this goal. At the onset of the mouse-skill test, they were told that if there would be enough time left after the test, they could engage in a lottery in which they could win tickets to a popular student party. Thus, spending more effort (by working faster) on the mouse-skill test was instrumental in attaining the goal to socialize. The participants indeed worked harder on the mouse-skill test when the socializing goal was primed, and this effect was stronger when socializing evoked a stronger positive reward signal in the minds of the participants (which was assessed in a separate implicit affective association task). Importantly, checks indicated that priming caused participants to pursue the goal independently of their reported motivation to attain it.”

¹⁸ Interestingly, Libet, in late life, raised the possibility that after the readiness potential and the conscious deciding occurs, you still might be able to consciously veto the action (stop yourself) which would mean we have *free won't* rather than free will.

¹⁹ Keep in mind that while consciously thinking about what to do is a type of conscious thought, much conscious thought is not an experience of choosing. For example, you consciously realize that you are reading this footnote.

²⁰ They reviewed experiments where conscious thought was manipulated (e.g. asking you to imagine a future action) and subsequent behavior was then observed, finding many studies where experimentally manipulating conscious

Imagine if there was not the experience of conscious choosing^{vii}

Imagine our brains evolved absent event II (the experience of conscious choosing never occurs). In which case, we would not know what we were going to do until we did it, meaning you would not be able to tell the kids you were for taking them for cheeseburgers rather than taking them to boarding school. Bertrand Russell learned he loved Lady Ottoline Morrel when he heard himself saying, “I love you.”²¹ Without II, communication and social interactions would be more primitive. The experience of conscious choosing conveys an important evolutionary advantage in terms of planning and coordinating. Many of us believe II is absent in birds, wolves, and other animals; if so, they can’t consciously plan; so, they can’t consciously coordinate their later actions—which gives humans a big advantage. Also, without the experience of choosing, your sense of self (conscious identity) would be lessened: believing that consciously choosing determines what happens next conveys an evolutionary advantage, even if it is not true—we are programmed to believe we consciously choose. In the 1890 words of William James,

But the whole feeling of reality, the whole sting and excitement of our voluntary life, depends on our sense that in it things are really being decided from one moment to another, and that it is not the dull rattling off of a chain that was forged innumerable ages ago. (James, 1890, quoted by Wegner)

James did not believe conscious choice is an illusion, but admitted it might be. If it is an illusion, as the evidence above suggests, it is, in the words of Wegner, the *illusion of choice*. If we were created in God's image, it is unlikely we would entertain such an illusion—God hopefully does not suffer from it.

Other evidence on conscious choosing and subsequent actions

An issue complicating the study of the relationship between the conscious experience of choosing and the subsequent action is you can’t, by definition, consciously know whether your unconscious determined what you did—you cannot be conscious of your unconscious.

thought influenced behavior (e.g. you are more likely to perform an action if you first imagine performing it). As Baumeister and Bargh note, none of the experiments contradict the Libet result that the immediate cause of behavior is unconscious.

²¹ Morrel, a dramatic British socialite and patron of the arts, had an open marriage and was off and on with Russell for many years; she had many lovers. D.H. Lawrence portrayed her in *Women in Love*, and some critics believe she was the inspiration for *Lady Chatterley*. <http://www.theguardian.com/uk/2006/oct/10/books.booksnews>

Consider how the perception of choosing to act, followed by the act, and finally an outcome can be distorted. Begin by deconstructing what Ralph said at the bar:

Yesterday I decided to go duck hunting, saw a duck in the sky, choose to shoot, shot the duck, and my dog retrieved the now-dead duck that I shot.

The sequence as Ralph perceives it is (1) he had the both the experience of consciously choosing to go hunting shoot and choosing to shoot at a duck; (2) he shot his gun in the direction of the duck; (3) the duck was shot at because he consciously chose to shoot at it; (4) he is in possession of a dead duck; and (5) he believes he committed duckicide. In Ralph's mind, he chose to shoot and this resulted in an outcome, dead duck in his possession. But, for Ralph to be correct, these five implicit conjectures must all be correct. The neurological research throws conjecture (3) in doubt, even if (1) and (2) are correct. So, what about conjectures (1), (2), (4), and (5)?

To initially keep things simple, assume there is a dead duck in Ralph's possession, so (4) is correct. (1) is incorrect if his recollection is false; maybe he shot reflexively but, being a responsible gun owner, Ralph can't imagine shooting without first deciding to, so concludes he must have decided to shoot. Maybe (5) is incorrect. Maybe another hunter shot at the same time as Ralph, or maybe the duck died in midflight of natural causes as Ralph shot his gun. Maybe (2) is incorrect, maybe he did not shoot in the direction of the duck and he only believes he did because after he shot, the duck fell from the sky.

At this point, you are probably saying “**Whatever**—Sure (1), (2), (4) or (5) might be false, but why sweat such unlikely events.” Sweat them; we are great at: (A) imagining we experienced conscious choosing when we didn't; (B) believing the experience of choosing causes what we do; (C) believing we caused an outcome to occur when we did not (or believing we did not cause an outcome when we, in fact, we did); and (D) believing the outcome is different from what it is. Also, keep in mind that action doesn't require the experience of choosing to act. This plus these four inclinations make it likely we will misinterpret the importance and influence of conscious choice—independent of (3).

Let's start with most of what we do is NOT preceded by conscious choosing

One way to think about the relationship between conscious choosing and a subsequent action is to contrast that relationship with actions that are not preceded by conscious choosing.

[Economists typically are not explicit about whether a purchase (e.g., buying a TV or going to Chez Faux for dinner) first requires conscious choosing.]

We are all aware that many of our actions are not preceded by a conscious decision to take the action, so called automatic behaviors/involuntary act, so you know action does not require prior conscious choosing. Examples of *automatics* include the different components of physical activities such as walking, skiing, driving and breathing—the mechanics are mostly produced unconsciously. (Imagine if to breathe you had to always consciously inhale and exhale.²²) Other examples are habits, instinctive reactions to things unexpected (touching hot stove), and impulsive acts driven by emotions— “I killed them both in a jealous rage and then drove to COSTCO to buy toilet paper, but somehow came home with a riding lawn mower.”

Research and experience demonstrate that if the spinal cord receives data that there will be bodily injury if immediate action is not taken, it will send instructions to the muscles to immediately act even before you are consciously aware of any danger²³—only after you dive out of the way do you consciously register what happened. There is an evolutionary advantage to forego conscious choosing when delaying the action would get you run over. But danger is not required. A Williams’ sister is more likely to win Wimbledon if she does not consciously choose how she will hit every ball flying her way. If some attractive other smiles as you pass on the street, you either react, or loses the opportunity. Circumstances that require quick response are not the only situations where we forego conscious choosing. Warren Buffet's son supposedly claimed his father changes his portfolio when his back starts hurting, not because he consciously weighed new information (reported by Malcolm Gladwell in *Blink*).

With respect to A (believing we experienced conscious choosing when we didn't)

In a 1977 experiment by [Richard Nisbett](#) and [Timothy Wilson](#), subjects were asked to memorize a list of word-pairs, and in one treatment the list included the pair "ocean-moon". Afterward, participants were asked to name a laundry detergent. Those whose list included ocean-moon were much more likely to answer Tide—not surprising. But, when asked why they said Tide, the subjects said things like "Tide was the detergent their mother used." Or “It has a

²² Conscious breathing is the norm in endurance races, meditation, and scuba diving.

²³ Stepping on a tack fires pain neurons in your foot; the message is transmitted to your spinal cord; from there one message goes to your brain and the other heads straight back down a motor neuron to your foot, causing a muscle contraction before you register the event. Bear et al. have a nice diagram.

cool box,” but hardly anyone said, “Because I memorized ‘ocean-moon’.” They imagined consciously choosing to say Tide because afterwards they felt compelled to self-rationalize their choice of words. We do not have full conscious access to the parts of our brain that determine our behavior—I observe my behavior, and then create an explanation that I find plausible and works for me—sometimes my explanation is even correct.

With respect to B (believing the experience of conscious choosing causes what we do)^{viii}

We all want to believe we exert conscious control over our lives, so are compelled to attribute many outcomes to our conscious reckonings,²⁴ but choice experiments demonstrate that the probability of you choosing a particular alternative can be manipulated by messing with your unconscious, independently of what you consciously reason. This supports the neurological results discussed above.

Specifically, recent studies with subliminal cues demonstrate that choice can be influenced by these cues (information that never reaches conscious awareness). Subjects are shown a piece of information for a short period of time (msec.) followed quickly by, for example, a random letter which masks the information. Behavior is influenced, which demonstrates that the conscious is not always in charge, even when we think it is.²⁵

Subliminal persuasion is most easily demonstrated when it addresses a conscious physical need (hunger, thirst, etc.). In 2006, the psychologists [Johan Karremans](#), [Wolfgang Stroebe](#) and Jasper Claus demonstrated

priming of a brand name for a drink [Lipton Ice Tea] will only affect choice behavior of people who are thirsty (i.e. have a goal to drink)

Supporting this finding, in a 2009 study, [Christina Bermeitinger](#) and her coauthors showed

Subliminally presented brands of dextrose pills biased choices of tired (but not non-tired) participants.

More recently, [Thijs Verwijmeren](#) and colleagues investigated the influence of subliminal cues on choice of beverage when one of the products was consumed more frequently than the other. The two beverages were Lipton Iced Tea and Spa Rood (a popular Dutch brand of mineral

²⁴ This might be more of a Western thing in that Westerners, as compared to Asians, tend to view the world from a more individual-centric, personal “me” perspective.

²⁵ Subliminal research got a bad name in 1957 when [James Vicary](#) claimed he found that inserting “Drink Coke” and “Eat Popcorn” in movie frames caused movie goers to buy more of each. He could not replicate the study and later said the whole thing was a gimmick. His initial claim caused a public uproar, and made research on subliminal cues a dangerous endeavor, and led to subliminal advertising being banned in Australia, Britain and the U.S.

water). The cue was either “Lipton Iced Tea” or a control. The cue only influenced choice if the subject was thirsty, consistent with the two other studies. If the subject habitually drank Lipton, the Lipton cue had no influence, even if the subject was thirsty. But, if the subject more habitually drank Spa Rood, the Lipton cue increased the probability they would choose Lipton: respondents chose an alternative different from the beverage they typically chose because they were presented with information they were not consciously aware of—conscious processing did not determine their selection.²⁶

Summarizing, subliminal cues affect choices when one is motivated to fulfill a physical need. This raises the question of whether choice can be affected by subliminal information when the motivation is more implicit, for example, a motivation to succeed. This conjecture was tested and found correct in 2012 by [Maxim Milyavsky](#), [Ran Hassin](#) and [Yaacov Schul](#): information processed unconsciously can influence choice whenever there is a motivation for choosing, not only when the motivation is a physical and conscious need.²⁷

With respect to C (believing you caused it when you didn’t, and believing you didn’t when you did)^{ix}

The Denver Broncos football team lost the 2014 Super Bowl because I, stupidly, was not paying attention during the Bronco’s disastrous first-play from scrimmage.

Exotic examples of things we cause but don’t think we cause are the voices schizophrenics hear, the things hypnotized people do, and the words we spell out on Ouija boards. Many students who get a *D* on my first midterm believe they did not cause their *D*: Edward asked questions that were tricky, misleading, and were not on material covered in class. In contrast, *A* students believe their conscious efforts caused the grade. When we pray to God to

²⁶ None of these studies debriefed on why they made the selection they made. In a personal email Thijs Verwijmeren speculated that if asked the subjects would have come up with an incorrect reason for their choice.

²⁷ Motivation to achieve was manipulated: before a “separate” choice task, subjects played “find the words” in a square of letters. One set of subjects’ letter-squares included words related to achievement; the other treatment (the control group) saw only motivationally-neutral words. Then, before the choice task, each subject was subliminally cued with a word, or non-word. There were 16 word-cues and 16 non-word cues, and each cue was related to only one of four word-categories (emotions, cloths, family and fruits). E.g., the emotion words were love, joy, anxiety, and jealousy, and the emotion non-words were nadsach, sitam, dagma, and ragham. Then the four word-categories came on the screen and the subject had to guess the correct category (e.g. fruits if the subliminal cue was mango). Correct guesses were rewarded. The subjects in the control group guessed correctly no better than random; the subjects who were motivated to achieve guessed correctly significantly better than random. The critical point is that these subjects were not consciously aware that they had been motivated to achieve.

give us strength to act, and then act, we attribute the act to God rather than to ourselves. Such an attribution is problematic if God does not exist or does not care what we do. When I could not find the most recent version of this paper on my computer it was, of course, not an operator error.

We have all heard of false confessions, even ones where the confessor believes they did it. In 1996 [Saul Kassin](#) and Katherine Kiechel produced these in the laboratory. Each subject was falsely accused of crashing the experimenter's software, thus losing the data from the study. The subject typed a list of letters read off by a partner (actually a research assistant, who read the letters either 43 letters a min. or 72 lpm.). Before the trial started, subjects were warned that if they hit the ALT key the software would crash and the data would be lost. After sixty seconds of typing, the experimenter said the program crashed and accused the subject of hitting the ALT key. All subjects initially denied it; none had actually hit ALT. The experimenter then turned to the partner and asked if she saw anything. She either said "I did not see what happened," or "I saw the subject hit the ALT key." Of the subjects who heard 72 lpm, and were witnessed against, 100% signed a confession, and 65% "came to believe they were guilty" (when leaving, the "next subject" who happened to be standing outside and had heard the commotion (really another R.A.) privately asked "What happened?"). 35% confabulated details to support their false beliefs (they were asked in the debriefing to say when they hit the ALT key).

Of the subjects who heard 43 lpm, and were witnessed against, 89% signed the confession. Of those who got this slow pace and were not witnessed against, 35% signed the confession. In summary, it is not difficult to make you think you did something you didn't, even if it's a bad thing. [Billy Wayne Cope](#) is in jail for raping and murdering his daughter. He confessed and provided gory details after the police told him the semen in her vagina matched his DNA—it did not—the DNA was much later matched to a rapist who had recently moved to the neighborhood.

My hard work, not my co-authors, is responsible for many of my published co-authored papers, but my co-authors believe it was their hard work. Correctly attributing an outcome that results from a complex interaction between people (work, social, sexual) is difficult—exactly who initiated that kiss? And, if we like the outcome, we tend to attribute it to our efforts, but to others if we don't. This is called *self-serving attribution*; it increases self-esteem.

As noted earlier, there is the tendency to ascribe causation if physical action on our part immediately precedes an observed outcome. (I flicked the switch and the light came on. I shot in the air and a duck fell to the ground.) If A proceeds B we tend to infer A caused B, particularly if B is desirable, so we take authorship for A. Man evolved to think in this second-best manner. Consider an experiment where every second or so you choose whether to press a button or not, and then a light flashes or not: the light does not always flash after you push it, and sometimes it flashes even when you didn't push the button. Treatments vary in terms of the actual amount of control you and other subjects have over the light (e.g. 25%, 50% and 75%)—complete control (100%) means the light flashes every time you push the button and never flashes when you don't.²⁸ You can be tricked into thinking you have more control than you have simply by increasing the number (not the proportion) of times where the outcome is what you predict (the number of successes), independent of your actual amount of control. That is, we will conclude we control the light if we observe enough occasions where we flicked the switch and the light came on, plus occasions where we did not flick and the light did not come on.

In a 1979 light experiment, [Lauren Alloy](#) and [Lyn Abramson](#) studied perception of control using a sample that intentionally included both depressed and non-depressed subjects. The non-depressed subjects, but not the depressed subjects, overestimated how much control they had over whether a light came on. Like the study described above, subjects flicked a switch and a light either came on, or not. Their subjects suffering from depression accurately assessed their lack of control—which might have something to do with why they were depressed in the first place. A conjecture for why we suffer from an *illusion of control* is actual control is easier to recognize than no control (independence between our actions and what happens next). In a very simple 1983 experiment by [Howard Tennen](#) and Jeanette Sharp, the light came on a fixed proportion of the time independent of whether the subject pushed the button, so the subject had no control, but the subjects experienced the illusion of control. Prior to the trials, each subject was classified as either an *internal* or *external* type using an [I-E scale of control orientation](#). [Externals tend toward believing what happens is out of their control, whereas internals tend to

²⁸ With 25% control, the light comes on 75% of the time when the button is pushed and 50% of the time when the button is not pushed; whereas, with 50% control the percentages are 75% and 25%. That is, control is the difference between the two percentages.

view their actions as having influence.] The hypothesis was that internals would suffer the illusion of control, but not the externals. Both types suffered it, internals just more so.

[Ap Dijksterhuis](#), [Jesse Preston](#), Daniel Wegner, and Henk Aarts have shown whether or not you take credit for an action can be influenced by subliminal cues that “direct attention to self”.²⁹ Subjects looked at a sequence of strings of letters on a computer screen in a fast race with the computer to determine whether each string was a word. They were told the first response (theirs or the computer’s) would blank the screen, after which another string appeared. In fact, it blanked half-a-second after each string appeared, independent of what the respondent did—the subject never caused the screen to blank. After each trial, the subject was asked if they answered before the computer. Before each trial the subject was subliminally cued with either a personal pronoun (“I” or “me”) or a neutral word. When cued with a personal pronoun the subject was more likely to say they beat the computer. Subjects subliminally cued with the word “God” were less likely to say they beat the computer, but only if they were believers. [It is probably fair to say that many believers attribute many, if not most, outcomes to God—God’s will.] In another experiment Aarts demonstrated that in situations where causation is unclear “feeling of control and self-causation” are enhanced if success is subliminally conveyed.

With respect to D (believing the outcome is different from what it is):

There is **it** and what **caused “it”**, this sub-section is about whether **it** is true, not what caused it. Was the dead duck really dead, or even a duck? My mother once called to report her sister died and to tell me she had called the funeral home to come for the body—the funeral home went to the hospital and reported back to her that their services were not yet required. People make mistakes about the facts on the ground.

Truth, like beauty, is in the beholder’s eye. The accused believes there was no rape because the accused believes the victim wanted to have sex, believing the victim chose to have sex and sent signals indicating this. The accused is attributing the sex to a choice made by the other party when, in fact, the other party did not necessarily make that choice, and, if she didn’t,

²⁹ In a 2013 paper [David Shanks](#) (a cognitive psychologist) and his coauthors report that they couldn’t replicate another Dijksterhuis finding, his finding that people who think about professors just before they take an intelligence test do better than those who think about football hooligans. This, in part, has called into question the findings that “behavior can be influenced or ‘primed’ by thoughts or motives triggered unconsciously...” (Nature 2013). In a [2012 open letter](#) to researchers in social priming, Daniel Kahneman said more replication of results in this area was needed, but that he is a “general believer” in priming effects.

the accuser caused the sex. The majority of Americans believe Barack Obama is a U.S. citizen, but many don't. Some believe our planet is warming, some don't, and everyone can't be correct. We judge truth based on what is happening around us, filtered through personal perspective: "facts" reported to us by second-hand sources we trust and sources we don't trust; our implicit biases; and what our group/tribe believes.

Finally, keep in mind that your actions are influenced by your unconscious does not, by itself, imply you are not making choices—it is **your** unconscious. Unconscious choice is consistent with the axioms of CT. Causal determinism must be the case unless you subscribe to religion, spirits, or randomness. (There are many subscribers.) Casual determinism is consistent with actions being initiated at the unconscious level. The question of whether you can make a choice—consciously or unconsciously—in a world of causal determinism comes down to how choice is defined.

Summarizing

Two questions have been addressed: what is a choice, and do humans make choices. CT assumes, obviously, that you, and economicus, make choices: "choice" is in the theory's title. But, saying that behavior (as explained by CT) is chosen behavior is inconsistent with the street-sense of the word *choice*, which is you could have chosen differently. CT assumes you must experience your highest-ranked feasible bundle, and both your ranking and what is feasible are given, so you can't behave differently than you behave. Your behavior is deterministic, imposed on you: you can't change your ranking of bundles or what is feasible, and you are forced to experience your highest-ranked feasible bundle. These rules make your behavior deterministic, and in a specific deterministic way. CT assumes, in philosophical free-will speak, that your behavior is *causally deterministic*.³⁰ Most people believe the behavior of animals and refrigerators is causally deterministic, but are disinclined to believe human behavior is causally deterministic.

The question is to how to make the behavior of you and economicus *choices*. It is done by defining, implicitly, a choice as a situation where exogenous constraints limit you to no fewer

³⁰ One can avoid causal determinism by assuming behavior has a random component (e.g. random-utility models) but, but if the expression of the random term is exogenous, you still are constrained to do what you do.

than two alternatives. That is, if internal factors constrain you to one of the two or more alternatives on the table, it is still a choice.

Many physicists and neuroscientists are *incompatibilists* (believe causal determinism is incompatible with free will and choice). Many philosophers are *compatibilists*, believing causal determinism is consistent with free will and choice. Economists tend to be implicit, and unaware, *compatibilists*; that is, we implicitly define free will as “your will is free if external constraints do not limit you to one alternative.”

While economists share their belief in deterministic compatibilism with many noted philosophers, they should be aware that most physicists and neuroscientists, and many philosophers, reject the argument that free will is compatible with casual determinism.

Related, is the issue is whether the conscious experience of choosing influences which alternative you select. While most of us believe that the process of conscious choosing determines which alternative we select, there is strong and mounting evidence that most, or all, choices are made unconsciously: at the final step, the unconscious selects the alternative and, sometimes, you then have a conscious experience of choosing what your unconscious decided on. While this is not fatal for CT (most axiomatic expressions of CT say nothing about the conscious vs. the unconscious), it is an injury. I suspect most economists assume the conscious experience of choosing is why you did what you did (most other people believe this as well, but unconscious choosing it not what most of us had in mind.

ⁱ Sources:

1. Henry James (1917) *Portrait of a Lady* (Vol. 1, Chapter XVI) A Project Gutenberg EBook <http://www.gutenberg.org/files/2833/2833-h/2833-h.htm>
2. Timothy O'Connor (2014) *SEP on Free Will* at <http://plato.stanford.edu/entries/freewill/>
3. Jennifer Uleman (2010) *An Introduction to Kant's Moral Philosophy*, Cambridge UK, Cambridge University Press.

ⁱⁱ Sources:

1. (Baruch) Benedict de Spinoza (2001) *Ethics Part II: Of The Nature and Origin of the Mind*, Blackmask Online (translated from the Latin by R.H.M Elwes) http://www2.hn.psu.edu/faculty/jmanis/spinoza/spinoza_ethics_2.pdf
2. James Boswell (1791) *Life of Johnson*, Book 3 books.google.com/books?id=L77nllU6hW8C
3. Daniel Wegner (2002) *The Illusion of Conscious Will*, Cambridge MA. MIT Press
4. Jennifer Uleman (ibid)

ⁱⁱⁱ Sources:

1. Jerry Fodor (2003) Why Would Mother Nature Bother? (Review of *Freedom Evolves* by Daniel Dennett). *London Review of Books* 25(5): 17-18. At <http://www.lrb.co.uk/v25/n05/jerry-fodor/why-would-mother-nature-bother>
2. Daniel Dennett (2013) *Intuition Pumps and Other Tools for Thinking*, Kindle Edition, New York, W. W. Norton & Company.

^{iv} Sources:

1. [Carl Hoefer](#) (2010) SEP on *Causal Determinism* at <http://plato.stanford.edu/entries/determinism-causal/>
2. [Randolph Clarke](#) and [Justin Capes](#) (2014) SEP on *Incompatibilist (Nondeterministic) Theories of Free Will* at <http://plato.stanford.edu/entries/incompatibilism-theories/>
3. Shaun Nichols (2004) The Folk Psychology of Free Will: Fits and Starts, *Mind & Language* 19:473-502. <http://dingo.sbs.arizona.edu/~snichols/Papers.html>
4. Shaun Nichols and Joshua Knobe (2007) Moral Responsibility and Determinism: The Cognitive Science of Folk Intuitions, *Nous* 41: 663-685. <http://dingo.sbs.arizona.edu/~snichols/Papers.html>

^v Sources:

1. Daniel Dennett (2013) *Intuition Pumps and Other Tools for Thinking*, Kindle Edition, New York, W. W. Norton & Company
1. Shaun Nichols and Joshua Knobe (ibid)
2. Shaun, Nichols (2007) The Rise of Compatibilism: A Case Study in the Quantitative History of Philosophy, *Midwest Studies in Philosophy* 31: 260-270. <http://dingo.sbs.arizona.edu/~snichols/Papers.html>
3. Michael McKenna and Justin Coates (2015) SEP on *Compatibilism*, <http://plato.stanford.edu/entries/compatibilism/>
4. Shaun Nichols (2011) Experimental philosophy and the problem of free will, *Science* 331: 1401-03. <http://dingo.sbs.arizona.edu/~snichols/Papers.html>
5. Christian List (2014) Free will, determinism, and the possibility of doing otherwise. *Noûs* 48 (1): pp. 156-178. DOI: 10.1111/nous.12019. http://eprints.lse.ac.uk/46931/1/_lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_List_Freewill_2015.pdf

^{vi} Sources:

1. Daniel Wegner (2002) *The Illusion of Conscious Will*, Cambridge MA. MIT Press
2. Benjamin Libet, (2004) *Mind Time: The Temporal Factor in Consciousness*, Cambridge Massachusetts and London England, Harvard University Press.
3. Benjamin Libet, Curtis Gleason, Elwood Wright and Dennis Pearl, (1983) Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential) - The Unconscious Initiation of a Freely Voluntary Act, *Brain* 106: 623-642.

-
4. Susan Blackmore (2007) Mind over matter? *Pathos* at <http://www.patheos.com/blogs/monkeymind/2007/08/susan-blackmore-on-ben-libet.html> An obituary essay on Libet's research
 5. Chun Siong Soon, Marcel Brass, Hans-Jochen Heinze and John-Dylan Haynes (2008) Unconscious determinants of free decisions in the human brain, *Nature Neuroscience* 11: 543 – 545.
 6. Kerri Smith, (2011) Neuroscience vs philosophy: Taking aim at free will, *Nature* 477: 23-25. She provides a lay description of the last study and the next study.
 7. Itzhak Fried, Roy Mukamel and Gabriel Kreima (2011) Internally generated reactivation of single neurons in Human Medial Frontal Cortex Predicts Volition. *Neuron* 69:548-562.
 8. William James (1890) *The Principles of Psychology, Vol. 1*, New York, Henry Holt and Company http://books.google.com/books/about/The_Principles_of_Psychology.html?id=TMrfcaC8bYC
 9. Ruud Custers and Henk Aarts (2010) The unconscious will: how the pursuit of goals operates outside of conscious awareness, *Science* 329.
 10. Henk Aarts and Ap Dijksterhuis (2003) The Silence of the Library: Environment, Situational Norm, and Social Behavior, *Journal of Personality and Social Psychology* 84(1): 18-28. https://www.researchgate.net/profile/Ap_Dijksterhuis/publication/10958510_The_Silence_of_the_Library_Environment_Situational_Norm_and_Social_Behavior/links/0deec51f8b20a69e81000000/The-Silence-of-the-Library-Environment-Situational-Norm-and-Social-Behavior.pdf
 11. Rob Holland, Merel Hendriks, and Henk Aarts (2005) Smells like clean spirit: Nonconscious effects of scent on cognition and behavior, *Psychological Science* 16(9): 689-93. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.546.8181&rep=rep1&type=pdf>
 12. Aaron Kay, Christian Wheeler, John Bargh, and Lee Ross (2004) Material priming: The influence of mundane physical objects on situational construal and competitive behavioral choice, *Organizational Behavior and Human Decision Process* 95: 83-96.
 13. Roy Baumeister, E.J. Masicampo and Kathleen Vohs (2011) Do conscious thoughts cause behavior, *Annual Review of Psychology* 62: 331-61
 14. Roy Baumeister and John Bargh (2014) Conscious and Unconscious: Toward an integrative understanding of human mental life and action, Chapter 3 in *Dual process theories of the social mind* (eds. Jeffrey Sherman, Bertram Gawronski and Yaacov Trope), York, Guilford Press.

vii Sources:

1. Wegner 2002 (ibid)
2. Richard Nisbett and Timothy Wilson (1977) Telling more than we know: verbal reports on mental processes, *Psychological Review* 84(3): 231-259. This article has been cited more than eight thousand times.
3. Mark Bear, Barry Connors and Michael Paradiso (2007), *Neuroscience: exploring the brain: third edition*, Lippincott Williams

viii Sources:

1. Maxim Milyavsky, Ran Hassin and Yaacov Schul (2012) Guess what? Implicit motivation boosts the influence of subliminal information on choice, *Consciousness and Cognition* 21(3): 1232-41.
2. Johan Karremans, Wolfgang Stroebe and Jasper Claus (2006) Beyond Vicary's fantasies: The impact of subliminal priming and brand choice, *Journal of Experimental Social Psychology* 42: 792-798
3. Christina Bermeitinger, Ruben Goelz, Nadine Johr, Manfred Neumann, Ulrich Ecker and Robert Doerr (2009) The hidden persuaders break into the tired brain, *Journal of Experimental Social Psychology* 45(2): 320-326.
4. Thijs Verwijmeren, Johan Karremans, Wolfgang Stroebe and Daniel Wigboldus (2011) The workings and limits of subliminal advertising: The role of habits, *Journal of consumer psychology* 21: 206-213.

ix Sources:

1. Wegner (ibid)
2. Saul Kassin and Katherine Kiechel (1996) The social psychology of false confessions: compliance, internalization, and confabulation, *Psychological Science* 107(3): 125-128.
3. Saul Kassin (2007). Internalized false confessions, In *Handbook of Eyewitness Psychology: Volume 1, Memory for Events* (eds. M. Toglia, J. Read, D. Ross and R. Lindsay), Mahwah NJ, Erlbaum.
4. Lauren Alloy and Lyn Abramson (1979) Judgment of contingency in depressed and non-depressed students: Sadder but wiser? *Journal of Experimental Psychology: General* 108(4) 441-485.
5. Howard Tennen and Jeanette Sharp (1983) Control orientation and the illusion of control, *Journal of Personality Assessment* 47(4): 369-374.

-
6. Ap Dijksterhuis, Jesse Preston, Daniel Wegner and Henk Aarts (2008) Effects of subliminal priming of self and God on self-attribution of authorship for events, *Journal of Experimental Social Psychology* 44: 2-9.
 7. Henk Aarts (2007) Unconscious authorship ascription: The effects of success and effect-specific information priming on experienced authorship, *Journal of Experimental Social Psychology* 43: 119-126.
 8. Alison Abbott (2013) Disputed results a fresh blow for social psychology: failure to replicated intelligence-priming effects ignites row in research community, *Nature (News)* 497(7447).
<http://www.nature.com/news/disputed-results-a-fresh-blow-for-social-psychology-1.12902#ref-link-1>