Human unconscious processes *in situ*: The kind of awareness that really matters

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Abstract

The literature on unconscious influences on behavior uses two quite different definitions of 'unconscious'. One is based on subliminality of the stimulus. The other, a sense associated with George Washington, is based on unawareness of the influences and consequences of a stimulus event. While the former has its origins in Freudian theory, the latter is more applicable to human behavior in natural contexts, and hence more relevant to the wider cognitive community. Under this Washingtonian definition, data strongly suggests that unconscious influences on everyday life are pervasive and come from many different sources. Research evidence supports two main types: analyses of the current situation that influence how we feel and choose and which generate behavioral impulses, and the operation of important goals outside of awareness, which direct attention, alter preferences, and guide action. We note further that conscious thoughts and feelings themselves logically must originate in unconscious processes.

Midway through the second act of the musical *Hamilton,* George Washington has just decided not to run for another term as president. He asks his close friend and long-time ally Alexander Hamilton to help him write a farewell speech to the nation. In the play, only one line from that speech is delivered:

> Though, in reviewing the incidents of my administration, I am unconscious of intentional error, I am nevertheless too sensible of my defects not to think it probable that I may have committed many errors.

Washington used the word 'unconscious' in its colloquial sense to mean he was not aware of and did not intend any mistakes he might have made in his governance. Sixty years later, Charles Darwin used the term several times in his *Origin of Species* when referring to the unwitting use of the principles of natural selection by cattle breeders and crop farmers to create ever fatter cows and larger ears of corn.

In short, the word 'unconscious' has a long history in common parlance of meaning a lack of awareness of some influence or property, and an absence of consciously intending those influences or consequences. The term certainly did not originate with Sigmund Freud (see Ellenberger, 1970; Whyte, 1960), and has meaning independent of his or any other particular theory about it (Bowers, 1984; Greenwald, 1992). Importantly, it also had little if anything to do with subliminal stimuli – Washington was aware of his actions and decisions, Darwin's farmers of their sheep and cows. We bring the definitional issue up at the start because it matters a great deal to the relevance of unconscious processing in everyday life. Here we will use the term the way the founding father of the United States did – to refer to influences on a person's choices, feelings, goals and behaviors of which they are not aware and did not intend.

Yes, it *is* nice to have Washington on your side.

The Legacy of the Freudian "Separate Minds" Hypothesis

In archaeology, "in situ" refers to the study of an artifact where it was found, in its natural context, not removed to another location. When we do experimental psychology, we are rarely "in situ". The scientific control that laboratories enable is invaluable, yet not without its price, and both should be critically considered. Specifically, some areas of cognitive science took advantage of a well-controlled laboratory paradigm in which stimuli are subliminally presented, and went on to equate unconscious processing with what the mind can do with subliminal stimuli. By focusing on subliminal stimuli, these subfields took unconscious processes out of the context of everyday life, the context in which they evolved to be adaptive and useful (e.g., Dehaene & Naccache, 2001; Eriksen, 1960; Greenwald, 1992; Holender, 1986; Loftus & Klinger, 1992; Newell & Shanks, 2013; Postman et al., 1948). In this section we highlight four major problems with this operational definition: its muddled logic, its origins in Freud's notion of a separate unconscious mind, its lack of ecological validity, and its disconnect from evolutionary biology.

One big problem with restricting tests of 'unconscious' processing to the cognitive functions that our mind can perform with subliminal stimuli is that it confounds a quality of information processing (unconscious versus conscious) with the strength of the stimulus (weak and brief versus strong and long). Doing so creates two difficulties. First, we cannot know whether any obtained differences between subliminal and supraliminal presentation conditions were caused by the *quality* of processing (unconscious versus conscious) or by the *quantity* (intensity/duration) of the stimulus energy.

Second, confining the domain of unconscious processes to that which the mind can do with very brief and weak stimuli creates a body of research findings in which 'unconscious'

processes themselves are often weak and feeble (see Sklar et al., 2018). This problem only intensifies if one insists on priming concepts (such as tables and chairs and doctors and nurses) that are not central to people's core concerns. Indeed, the subliminal definition of motivationally neutral concepts led to summary conclusions in the *American Psychologist* that the unconscious is -- how shall we put it -- rather dumb (Greenwald, 1992; Loftus & Klinger, 1992). But of course it is, when defined this way, because the human mind did not evolve to process subliminal stimuli. Limiting 'unconscious' processes to what the mind can do with subliminal stimuli brings to mind *The Onion*'s parody of comparative research, in which a dolphin is tested on dry land with the researchers concluding that dolphins are actually pretty stupid.

Given this, why did some areas of psychology define unconscious processes in this ecologically invalid way? For an answer we go back 75 years to the "New Look" perception research (e.g., Allport, 1955; McGinnies, 1949; Postman et al., 1948). This research program was an explicit attempt to put Freudian propositions to scientific test. The main Freudian hypothesis that the New Look researchers tested was the notion of a separate unconscious mind as a censor or filter for conscious experience. The unconscious process was said to be primary and hypothesized to screen the world to block emotionally disturbing information from reaching conscious awareness (i.e., "perceptual defense"). In order to test this 'unconscious as censor' hypothesis the critical stimuli had to be presented at very brief durations and weak intensities to see what kinds of processes happened *before* stimulus information entered conscious awareness.

The focus on subliminal stimuli is an anachronistic remnant of Freudian theorizing from over a century ago. It is based on and implicitly assumes the Freudian model of separate conscious and unconscious minds. But there *are* no separate conscious and unconscious minds playing by different sets of rules. There is just one mind, operating sometimes in conscious and

other times in unconscious modes, with similarities and differences in the qualities and outcomes of processing in the two modes. Neuroscience, and the behavioral sciences, have now shown that similar brain regions and circuits are active when a given process is operating, whether or not the person is aware of or intending that process at the moment. Especially strong evidence in this regard comes from the decade-long research using unconscious goal priming to test the predictions of Goal Setting Theory (Locke & Latham, 1990, 2002), which was developed out of decades of research on conscious goal pursuit. The theory has been found to apply equally well to the case of unconscious goal pursuit, with the same moderators and limits and outcomes when the goal is pursued unconsciously as when pursued consciously (Chen et al., 2021).

One caveat of this literature is that most of it was designed to examine similarities, not differences. Given the different constraints on conscious vs. unconscious processes (see Nordgren et al., 2011), there may be interesting differences as well. Indeed, several other chapters in this volume (e.g., de Neys, Han et al., Schorn & Knowlton) describe distinct cortical and subcortical regions and pathways involved in implicit versus explicit learning and memory, and in motor functions. Comparing and contrasting these similarities and differences in the context of everyday life promises to be a fascinating avenue for future research.

A Modern Version of "Separate Minds"

There is a well-known contemporary version of the separate minds model, the System-1/ System-2 dual-process account of the human mind (e.g., Evans & Stanovich, 2013; Kahneman, 2011; for overviews see Sherman et al., 2014). This has interesting similarities to the Freudian separate-minds model, not the least of which is that the fast, intuitive System 1, while taking care of many of our more central tasks seamlessly, is also the source of error and mistakes that the slower and more deliberate System 2 must correct (Morewedge & Kahneman, 2010). It is

noteworthy that Kahneman himself (2011, p. 29) stated that there actually are not two different brain/cognitive systems: System 1/ System 2 were merely "fictitious characters", intended only as a useful heuristic in the context of making judgments and decisions. Yet despite Kahneman's proviso, other proponents within psychology continue to argue for its reality (see especially Evans & Stanovich, 2013) and many in and outside of psychology have embraced the System 1 and System 2 idea at face value, as a valid description of the actual structure of the human mind.

Clearly, the 'two systems' idea is as seductive today as it was during Freud's time. There are certainly important qualities and dimensions on which mental processes differ, such as fast vs. slow, effortful vs. effortless, and intentional vs. unintentional. That's not the problem. The problem is in saying that these important features all hang together in two *and only two* types of processes -- the 'alignment problem' (see Bargh 1989, 1994; Keren & Schul, 2009; Kruglanski & Gigerenzer, 2011; Melnikoff & Bargh 2018). According to the 'System 1 and System 2' approach, of the dozens of possible combinations of 4 or 5 dichotomous features, only 2 actually exist in nature. This seems rather unlikely (Keren & Schul, 2009), and indeed, the claim that there are only two types of processes – one that is fast, outside of awareness, unintentional, operating in parallel, and another that is slow, in awareness, intentional, and serial – demonstrably fails as a classification scheme for established cognitive phenomena (Kruglanski & Gigerenzer, 2011; Melnikoff & Bargh, 2018).

It is not only false, it misinforms the public in an important way. If there are only two types of processes, one with the opposite features of the other, this means that the presence of any *one* feature (e.g., awareness of the stimulus) necessarily means the given process also has all of the *other* defining features of that type (e.g., that the person also intends to process the stimulus, does so in a slow and deliberate manner, etc.). Because only two types of processes

exist – a given process has all of these features, or none of them. As we show, this is actually a dangerous conclusion to draw and scientific position to profess, because it (implicitly) holds people responsible (the intentional feature) for how they respond to a stimulus (an influence attempt) as long as they were consciously aware of that stimulus (the awareness feature). Given that the features do not hang together, this belief may easily lead to false accusations.

Yet this shaky, rigid two-systems approach is the basis for the insistence that researchers rule out, beyond the shadow of any doubt (see Hughes et al., 2009, p. 264), their participants having *any* conscious awareness of an influential stimulus, in order to draw conclusions about the unconscious nature of its processing. It pushes researchers to use an artificial laboratory method, subliminal presentation, which has little relevance to everyday life. It ignores the early wisdom of leading researchers of 'automatic' and 'implicit' processes (Reber 1993; Shiffrin, 1988), who emphasized that any real life mental process will be sufficiently complex to include both 'types'. As Reber (1992) put it, "it is unlikely in the extreme that any interesting cognitive process takes place totally devoid of contributions from both implicit and explicit systems."

The evolved mind: Conscious contents emerge from unconscious processes

Because the human brain evolved in these complex conditions, mental processes in complex real-life conditions involve both conscious and unconscious components, simultaneously as well as sequentially. Evolutionary theory and evidence have documented how the human brain developed organically and incrementally over time, with newer adaptive functions based on and integrated with already existing older circuits and processes (Bargh & Morsella, 2008; Dennettt, 1991, 1995). These older unconsciously-operating circuits developed long before the relatively late arrival of conscious processing (Deacon, 1997), and became

'locked in' as the foundational basis or 'starting points' for those later conscious processes (Reber, 1993).

In the first few decades following the cognitive revolution, the prevailing assumption among cognitive scientists was that human beings are aware of the key influences on their choices and decisions, which they make with full intention and awareness (Baars, 1986). This model – System 2, anyone? – is rather odd in multiple ways (see Bargh, 2016), not least because it entirely neglects the evolution of the brain, and the ontogeny and phylogeny of conscious processes. Thanks to the heuristics revolution led by Kahneman and Tversky, the behavioral sciences broadly (including, finally, economists) no longer assume that humans are rational and logical in any narrow sense. Yet somehow the companion idea that as humans we are fully aware of the set of influences on our choices and behaviors, which we then enact with complete intention and awareness, is still largely with us, sometimes advanced with an almost religious fervor.

When we follow the traditional, Washingtonian definition, there is ample data from across the cognitive sciences documenting unconscious influences on human judgment and behavior (see Bargh, 2017, this volume; Hassin, 2013). Why is this the case? Here we develop three avenues of explanation, which converge on the principle that unconscious processes are the building blocks from which all cognition – conscious and unconscious – is constructed.

First, evolutionary theories – as well as common beliefs – suggest that unconscious organisms preceded conscious organisms (e.g., Bronfmann et al., 2016). Accordingly, then, unconscious information processing – which is by far the dominant form of cognition – preceded conscious forms of information processing. Indeed, within our own brains, many of the areas and networks that have been found to correlate with consciousness reside in cortical areas, those

evolutionarily newer parts of the brains (Dehaene, 2014). Conscious processes are built out of the unconscious workings of the mind, which are themselves grounded in our deep evolutionary history (Reber, 1992; Rozin, 1976).

The second line of support for the primacy of unconscious processes rests on ample data from various brain injuries and other forms of neurological deficits. These show that implicit, unconscious processes often remain intact even when conscious processes suffer severe damage. (Interestingly, we know of no reports where unconscious processes suffer damage, yet conscious processes remain intact.) Reber (1992) noted that implicit learning and memory remain intact and robust across many disorders – including alcoholism, stroke, disease, tumors -- that cause a severe impairment in conscious functions and systems. Implicit effects can also survive physical trauma that produces amnesia, where explicit memory is lost but implicit memory effects are left intact (Shimamura, 1986; Shimamura et al., 1987; but see Sklar et al., 2021). Warrington and Weiskrantz (1968, 1974) showed that verbal priming effects – which are a form of implicit memory (Bargh, 2021) – remain intact in densely amnesic patients despite the absence of any explicit memory for the prime words. And in support of unconscious influences of everyday contexts, Graf and Schacter (1985) and Schacter and Graf (1986) showed that amnesiacs had better word stem completion performance when the test stem was presented in the same context as it had been during the initial priming stage of the study.

The third line of argument rests on a simple analysis of cognitive processes. Take vision for example. Light reflected from an object hits the retina. There are no conscious experiences of this. The neural information then spreads to the LGN. To the best of present-day knowledge, there is no conscious experience there either. The information then reaches the visual cortex and travels upstream. There, at some point (that scientists still argue about), we begin observing

correlations to conscious perception. Until this point, however, the information has been processed, integrated, merged, and categorized, all unconsciously – and these are the processes that allow us to perceive faces, houses, or any other category that we visually experience. From a functionalist perspective, we only need to know about those faces and houses and so forth, not about the extensive processing that led to our awareness of them. That is the case of vision, and while our scientific understanding of high-level cognitive and motivational processes is less developed, the logic applies equally there. Much preparatory work needs to be done in order to create our conscious experiences, and by logical necessity, all this work is unconscious (see Neisser, 1967).

Take decisions, an example in the realm of higher-order processes (see Sklar et al., 2021, for a more developed treatment of this issue). If one is to deny the central role of unconscious processes in shaping our decisions then one must argue that somehow, decision-related cognitions appear in our conscious thoughts out of nowhere. But if they just appear there not preceded by unconscious processes that help shape them, how do they come about? There are two logical options. Either they are somewhat random, or they are shaped by factors that are not unconscious; that is, they are shaped by conscious factors.

Let's consider these options, one at a time. The idea of random choices is unsatisfying. While some of our thoughts and decisions may appear to be random, many more appear to be related to our motivations, concerns and central themes (Baumeister & Masicampo, 2010; Huang & Bargh, 2014). To offer a satisfying account, one would have to make up a story about how random processes yield such associations and structures. There is, of course, no such account at present.

So we turn to the second option – that conscious processes created the decision-related cognitions that one currently consciously experiences. We move the analysis to them, and examine the factors that determine these processes. Where did they come from? If from conscious processes again, we move the focus of the analysis to those even earlier processes, and so forth – an infinite regression (see Sklar et al., 2021). At some point, we will get to an interface, a point where decisions/factors appear in consciousness, yet are not themselves determined by other conscious processes. (For example, adult humans instantly know when a sentence they hear is not grammatical, but they can rarely tell you what linguistic rule had just been violated.) If we agree that these are not random (or some kind of metaphysical, quasi-religious 'original causes'; see Bargh, 2008), then we can agree that they must have been determined by unconscious processes.

As Michael Gazzaniga, a founder of cognitive neuroscience, said in his Gifford lecture (2009): "Here's the fundamental fact…by the time you are consciously aware of something, your brain has already done it. How else can it be?" Indeed, for materialists like us – how else can it be?

Unconscious processes in everyday life: What the research shows

In the first section we highlighted the Washingtonian approach to unconscious processes, which focuses not on whether one consciously experiences an event (i.e., the subliminal definition), but on whether one is aware of the key influences of that event on one's choices and behavior. Moving forward, our operational definition of unconscious processes will be the traditional one: those influences that the person does not generate via a conscious intention, and of which she is not aware. This is the form of unawareness that matters in real life (Bargh, 1992). The person may be aware of the sources of these influences (or not) but that type of

awareness alone is not sufficient to conclude that the person was also aware of, and consented to, *how* that source affected them.

In casting off the shackles of the subliminal definition, unconscious processes take on renewed relevance to the activities and concerns of modern life. Here we sketch the major types of unconscious influence (for more complete reviews, see Bargh, this volume, 2017). First, we will describe *preconscious* input analyses (Neisser, 1967) that the person does not intend or know are operating; these are shown to furnish inputs into conscious judgments, choices, and behavior. Next come *postconscious* influences (Bargh, 1989) that produce unconscious effects similar to preconscious analyses but are caused by a carryover, lingering influence of typically conscious experiences.

Whereas these first two types often involve bottom-up influences driven by the current (external) environment, the next type exclusively concerns top-down unconscious influences in the form of motivations and goal pursuits; that is, unconscious goal pursuit. Neisser (1967) famously replaced the external stimulus environment of behaviorism with top-down, internal 'executive processes' as the proximal cause of higher mental processes. This was prescient – 50 years of research since has confirmed the powerful influence of the currently active goal on attentional, cognitive, evaluative, and behavioral processes (e.g., Bargh, Gollwitzer, & Oettingen, 2010; Custers, Vermeent, & Aarts, 2019; Hassin, 2013; Higgins, 2011; Locke & Latham, 1990, 2002; Melnikoff & Strohminger, 2020). In sum, the current goal largely reconfigures the cognitive system to best facilitate the pursuit of that goal (Huang & Bargh, 2014). Hence, like their conscious counterparts, unconsciously activated and operating goal pursuits have the potential to be powerful directive forces on human mental activity. (We

elaborate below on how the "replication crisis" has affected how we, and others, view some of the priming results.)

Preconscious processes. Preconscious or 'preattentive' perceptual input analyses shape and add meaning to incoming informational input, in ways that influence the conscious experience of and responses to that information (e.g., Neisser, 1967; Treisman, 1960). There was early debate on the extent of this analysis, with both 'early selection' and 'late selection' theorists arguing for relatively crude versus relatively rich analysis for meaning, respectively, prior to the products of the analyses entering conscious awareness (e.g., Deutsch & Deutsch, 1963; Erdelyi, 1974; Norman, 1968). An important example of contemporary relevance comes from social psychology, with the target person's physical appearance – racial, gender, or age related features – unconsciously activating internal stereotypes and assumptions about their personality, motives, and level of potential threat (see Kurdi & Banaji, this volume). There can be no better example of the importance of preconscious analyses in everyday life than the immediate racial profiling under time pressure that often leads law enforcement officials to take violent 'first strike' reactions against members of some social groups and not others (e.g., Correll et al., 2002; Gladwell, 2004, ch. 6). Again, we are using 'preconscious' in the Washingtonian sense: We are usually consciously aware of another person's skin color, but often unaware of the impressions and assumptions this feature activates in our minds, and how that internally-added information affects our judgments and behavior towards that person.

There are many other documented forms of preconscious influences, including immediate appraisals of an individual's personality traits and various judgments based solely on their face (Hassin & Trope, 2000; Todorov, 2017); physiognomy also seems to play a causal role in determining how quickly we become aware of a particular face (Abir et al., 2017). Similarly,

behavioral contagion and mimicry are often driven directly by the mere perception of others' current behavior (Chartrand & Lakin, 2013; Dijksterhuis & Bargh, 2001), and positive and negative affective reactions, or evaluations, often occur spontaneously (and unintentionally) upon the mere perception of objects and people (Bargh et al., 1992; Fazio et al., 1986; Ferguson, 2008). These affective responses, albeit fleeting, nonetheless exert a directive 'steering' function in the form of immediate and unconscious behavioral approach and avoidance tendencies (Chen & Bargh, 1999; Rougier et al., 2020).

Entering a standard situation or context can also immediately activate norms of behavior that guide how a person acts, without their knowing it. This can occur even if the person is not physically in that environment at the time; people talk more quietly *on the way to* the library (Aarts & Dijksterhuis, 2003) because "library", as a destination, is on their minds; investment bankers become more dishonest and greedy *at home on the weekend* if they've just been asked over email to write a description of their office environment (Cohn et al., 2014).

Postconscious processes. Postconscious influences (Bargh, 1989) are the temporary version of chronic preconscious influences (see Bargh et al., 1986; Higgins & Bargh, 1987). Postconscious influences occur when conscious experiences in one situation linger on into the next, because the mental representations active in Situation 1 remain active for a while and so are still active when the person has moved on to Situation 2. Implicit memory influences are of this kind, with conscious processing of stimuli in one experimental task influencing responses in a second, supposedly unrelated experimental task, even when the participant cannot explicitly recall those stimuli at the end of the first task (see Bargh, 2021).

The original priming studies in the verbal learning domain (Segal, 1960; Segal & Cofer, 1967) revealed that words presented in one experiment were more likely to be used as free

associates in a second, ostensibly unrelated experiment, independently of any explicit recall of those words. Social psychologists then made use of this 'ostensibly unrelated studies' paradigm, to show that personality trait words presented in a first 'memory' study then influenced the interpretation of ambiguous social behaviors (and thus degree of liking for the target person) in a second, impression formation study (Higgins et al., 1977). Many further extensions of this same laboratory priming method since have shown, for example, how rudeness in the workplace is contagious because it activates the internal mental representation of rudeness (Foulk et al., 2016; Bargh et al., 1996, Experiment 1), and how the day's weather influences attitudes towards climate change because of its priming effect on internal representations of 'hot' and 'cold' (Zaval et al., 2012). These carryover priming effects have been demonstrated as well in applied settings such as grocery store purchases of snack food, and productivity and cooperation in the workplace (see next section).

Unconscious goal pursuit. While preconscious and postconscious influences have a 'behaviorist' tang as unconscious influences of the external environment (Bargh & Ferguson, 2000), the idea of unconscious motivations has a distinct Freudian flavor. Indeed, there was for many years a kind of turf war between motivational and cognitive psychology as to whether motivation was needed to explain classic phenomena, most famously cognitive dissonance effects (Bem, 1972; Nisbett & Ross, 1980) and stereotyping (Hamilton & Gifford, 1976). The cognitive revolution did trigger the reconceptualization of many traditional areas of social psychological research into purely cognitive terms – attitudes, the self, prejudice, power, identity, situational contexts, and more. And so it was inevitable that this last outpost, executive processes (goals and motives) would finally fall to the cognitive siege, with goals conceptualized as mental representations (Bargh, 1990; Kruglanski, 1996). Once goals were understood in these

cognitive-structural terms, research questions naturally arose such as whether goal representations might be capable of unconscious activation by relevant environmental stimuli, just as had been found for other types of mental representations (Bargh & Gollwitzer, 1994).

But Freud was not the only one to posit unconsciously operating motivations; it has long been standard issue in our sister fields of comparative psychology and evolutionary biology. Evolutionary biologists such as Ernst Mayr (1976) regarded human goal pursuit systems as a necessary proxy, in local time, for the evolutionary directives of the distant past – this because of the very slow pace of genetic modifications driven by natural selection processes, coupled with the much faster changes in environmental and social/cultural conditions. A subset of those goal pursuits, the evolved primary motives, represent the eonic constancies in those living conditions, and so operate in nearly all animals: these are the paramount and fundamental motivations of survival and safety, reproduction (mating), disease avoidance, resource acquisition (related to hunger, shelter, warmth), and (in social animals) cooperation. In humans they operated to keep us safe and (re)productive long before the relatively recent emergence of the more conscious, strategic forms of thought and control over choices and behavior about 100,000 years ago (see Corballis, 2007; Deacon, 1997; Dennett, 1995).

Because of their ancient status, these unconsciously operating primary motives became locked in as the foundation for later developing processes that today rely on their outputs (Reber, 1992; Simon, 1962). Accordingly, our modern goal pursuits and the attitudes and belief systems that support them can often be traced backwards as ultimately in the service of the primary motives. In practice, this means that often what we personally believe are attitudes and ideologies arrived at by higher-order reasoning from first principles -- about social and political

issues, for example -- may in fact be in the service of satisfying our deeper evolved primary motivations, without our realizing it (e.g., Huang et al., 2011; Napier et al., 2018).

Experimental work in psychology and neuroscience has shown that the basic mechanisms of goal pursuit – goal activation and reward/incentive detection – can operate unconsciously the same way they do consciously. Pessiglione and Frith (2007) had participants engage in a hand grip task during brain imaging and presented reward cues (pound or a penny coin) either supra- or subliminally; regardless of whether the coin was visible or not, it differentially activated brain regions associated with reward and increased task effort based on its value. Aarts, Custers, and Marien (2008) and Takarada and Nozaki (2018), among others, replicated this finding and showed further that the goal itself could be triggered by a subliminal goal-related cue. In social and organizational psychology, there are now hundreds of studies on goal and behavioral priming in which goals and behaviors such as achievement, cooperation, rudeness, learning, and helpfulness are put into play verbally (or through photographs), without the participants' Washingtonian awareness of the goal/behavior activation, and produce the same effects as when that goal/behavior is consciously and intentionally pursued (see meta-analyses by Chen et al., 2021; Weingarten et al., 2016). And in health psychology, healthy eating and dieting goal priming interventions have been successfully used to reduce snack food purchase in grocery stores and consumption of fatty foods in butcher shops (Papies, 2017; Papies et al., 2014).

The replication crisis

While it is clear that data for Washingtonian unconscious processes come from many parts of the cognitive sciences (e.g., memory, judgment and decision making, perception, planning, inference), the area of priming has gained much attention in this literature. The domain of high-level priming – whether of goals, behaviors, or what has mistakenly become known as

"social" priming (Sherman & Rivers, 2021) – was one of the first to be hit in what became to be known as the replication crisis in psychology (see brief review in Weingarten et al., 2016; also Molden, 2014). It is worth noting that some of our own work has generated failed replications (e.g., Doyen et al., 2012; Klein et al., 2014).

The important question for present purposes is whether these failed – and also successful – replications warrant an update of our views on unconscious processes and their effects. The answer is a resounding 'yes'. We now appreciate, with many others, that some effects that seemed at first to be strong and robust, may be weaker than they first appeared (especially if they had been based on small samples; Donnellan et al., 2015); others may even be non-existent (Carney et al., 2010); underlying mechanisms may have been different than those originally assumed (Dijksterhuis & Bargh, 2001; Wheeler et al., 2007), and there may be limiting conditions to the original 'general' effects (see Bargh, 2006; Bargh et al., 2012; Dijksterhuis, 2014). Although we believe that the failed-replication studies are not without their faults (see Ackerman, 2018; Bryan et al., 2019; Gilbert et al, 2016; Ramscar & Port, 2015; Stroebe & Strack, 2014), we also believe that the crisis has changed how we do and understand our science – mostly for the better.

Needless to say, many Washingtonian unconscious effects are robust (see Bargh, this volume; Kurdi & Banaji, this volume), and several of the basic unconscious priming effects that were originally based on small samples (such as goal priming and automatic evaluation) have stood the test of time, especially after greater power was obtained by aggregating over decades of studies (Chen et al., 2021; Ferguson & Mann, 2014; Herring et al., 2013; Rougier et al., 2020; Weingarten et al., 2016). Overall, the emphasis on robustness and replicability has validated some unconscious effects and not others.

Why so much resistance?

The human mind is what it is. There is plenty of evidence that a lot goes on up there without our knowing it, and for the most part this is an adaptive arrangement because we don't *need* to consciously know about all the various processes. And also, that this arrangement is the outcome of eons of natural selection, producing unconsciously operating motives and needs designed by nature to keep us safe, getting along with each other, and have babies. Yet over the past century there has been such resistance within mainstream psychology (but again: not within neuroscience or evolutionary biology) to the idea that there is a significant unconscious influence on everyday life.

An early form of this animosity was the attempt to define unconscious processes out of existence. In the wake of the New Look research program, Eriksen (1960) among others (see reviews in Erdelyi, 1974; Weinberger & Stoycheva, 2019) explicitly equated the human mind with conscious processes, a philosophical position most strongly advanced by John Locke, and from this premise deduced that unconscious influences or states of mind were a contradiction in terms. (As Dennett [1987] put it, "to a Lockean the notion of unconscious thought was incoherent, self-contradictory nonsense.") Later on, Holender (1986) revived this line of argument, equating *any* effect of a stimulus on responses as evidence of a conscious process, thus making it impossible to find evidence of unconscious processes – in effect, an unscientific theoretical position because it could never be falsified (see Popper, 1952).

A variant on this elimination-by-definition approach was to equate unconscious processes with very weak or brief stimuli by insisting on the use of subliminal stimulus presentation to study them. Because of the very weak stimulus intensity, researchers then draw conclusions about the 'dumb' unconscious and the very weak effects the 'unconscious mind' is able to

produce. Even when rather significant processes are still found using subliminal stimuli (see examples above, also Bargh, this volume; Dehaene, 2014; Hassin, 2013; Soto & Silvanto, 2014), skeptics will then shift the goalposts and retreat to a third line of defense: that the stimuli really were not subliminal, that participants were actually aware of the stimuli, or of some stimuli, or of parts of the stimuli, and that only weak measures of conscious awareness of the stimuli were used and this resulted in an underestimation of the amount of conscious knowledge that participants had (Newell & Shanks, 2013).

For decades now, the burden of proof has been entirely on the shoulders of researchers who draw the conclusion that a given process or influence was unconscious. The bar is set extraordinarily high – not proof beyond a reasonable doubt (which is what empirical sciences are all about), but *beyond any doubt at all* (see also Hughes et al., 2009). And it is noteworthy that the bar is set much lower for researchers who conclude that conscious, deliberate processes produced their obtained effects – this conclusion is permitted by default, without the need to provide much actual evidence to support it. Claims for the conscious, intentional, and deliberate nature of a given phenomenon or effect are rarely if ever accompanied by a thorough and systematic attempt to rule out potential unconscious causes (Hassin & Milyavsky, 2014), but systematic attempts to rule out all possible conscious causes (even far-fetched ones) *are* required when making claims about the influence of unconscious processes.

Priors, or starting assumptions, make a huge difference as to the conclusions a study can draw. Skeptics of unconscious processes assume the conscious nature of any judgmental or behavioral outcome by default, and this places the burden of proof on conclusions regarding the unconscious nature of the effect. But if one started with the opposite priors, and assume that the outcome is produced by unconscious processes, then the burden of proof would be on

researchers wishing to contend that the effect was consciously produced). Because of the relative (statistical) ease of accepting versus rejecting the null hypothesis in the two cases, the body of evidence supporting one position versus the other changes dramatically merely as a function of which prior assumption one makes.

Consider in this regard the longstanding debate, from Isaac Asimov to Christoph Koch, as to whether robots have, or ever will have consciousness. Here the starting point, the priors, are completely opposite to those held in the case of human beings. It will take extraordinary evidence for someone, someday to conclude that the latest, most advanced version of robot is indeed conscious, and is aware of what they do. Crucially, the *exact same amount and form of evidence* that in contemporary psychological science would lead to the conclusion that the human who made these choices or performed these actions, did so consciously and intentionally, would lead to the conclusion that the robot who did so was operating unconsciously.

Our default assumptions should be theoretically motivated and anchored in existing literature. Given all the considerations outlined above, we see no reason to adopt the default that all high level cognition is conscious. In fact, if we were forced to adopt a simplistic view, we would choose the opposite. But what is important here is not anyone's view but that the field appreciates that in order to understand how the mind works, it is crucial to have this discussion about defaults (Hassin & Milyavsky, 2014) – with this discussion based on actual evidence.

Now that this one-sided favoritism is exposed, we return to the question of why it exists in the first place. We can speculate on several reasons. First, one of the founding assumptions of cognitive science was that human beings are rational and logical and are aware of the influences on their choices and decisions, which they make with full intention and awareness (Baars, 1986). Considering that it had just fought and won a revolution against behaviorism,

which for decades not only insisted conscious thought was a mere epiphenomenon, but even prohibited its study, this starting assumption is understandable. A second possible reason is related to the first, that unconscious processes continue to be associated with psychoanalysis and the 'anti-science' legacy of Freudian theory (see Crews, 2017). But here, of course, the proper scientific approach is to consider the validity of a psychological phenomenon separately from any particular theory about it (Bowers, 1984).

Another reason for the bias appears to be the appeal to 'common sense' when evaluating claims of unconscious processes -- which if you think about it, is actually a reliance on conscious intuition as a judgmental heuristic. The problem with using common sense as a criterion in the case of unconscious processes is rather obvious, because, by definition, we are unaware of our unconscious processes. Common sense will therefore always side in favor of conscious instead of unconscious influences. And indeed more is needed than mere common sense. Because we do not have direct access to internal sources of causation (Wegner & Wheatley, 1999), our common sense beliefs about what caused what can often be wrong, and the research evidence indeed shows that our conscious understanding of ourselves is limited and often incorrect (Nisbett & Wilson, 1977; Wilson, 2002). We miss powerful influential factors entirely and erroneously assume other factors were influential when they were not.

But more than this, it is our task as scientists to go beyond the obvious and superficial, because if only common sense were needed we all would (and should) be out of a job. Science never advances our knowledge if it stops at the intuitive, superficial and obvious. Take the electromagnetic spectrum for example, where only a small fraction of all wavelengths are visible to the naked eye. It took science and engineering to discover microwaves, radio waves, gamma waves, and x-rays. And so to skeptics who base their position against unconscious processes on

common sense and what feels intuitively right to them, we say, as did Hamlet to Horatio, that there are more things in heaven and earth than are dreamt of in your philosophy.

Conclusions

Definitions matter. By its historical and everyday, 'Washingtonian' meaning, unconscious influences pervade human life -- indeed they are essential for it. Many important transformations of external information occur of which we are not aware, and often that we would rather not occur. Many of our conscious purposes are actually in the service of evolved goals and motives, without our realizing their true, deeper source. Feelings and tendencies activated in one situation carry over to influence us in the next, coloring our experience there even as we, as "presentists" (Gilbert & Wilson, 2007), believe it is all and only about the present moment. And our preferences, selective attention, and behavior are guided by situational contexts and the motivations associated with them, whether or not we are aware of these motives and sometimes when we are not even physically in those contexts to begin with.

The true unconscious influences of everyday life are not the result of subliminal stimuli but the effects of consciously perceived objects, people, messages, and events – effects on us of which we are not aware. We can learn from an objective psychological science where our blind spots are, and when and where and how we are pushed away from our core values and ideal self. The concept of "unconscious bias" in society (Kurdi & Banaji, this volume) is now so mainstream that there is a CNN documentary with that title. People who as far as they know are non-racist, nevertheless possess unconscious biases that influence their hiring and promoting and voting and friendships and where they choose to live. It took science to discover these unconscious biases because people are not consciously aware of having them.

If we continue, as a field, to equate awareness of a stimulus with awareness of its influence, we risk licensing the practice of holding people responsible for decisions and actions they make unwittingly, unaware of significant causes operating upon them. Often, of course, such influences come from powerful agents such as politicians and advertisers. These choices and actions made unwittingly are usually in the interests of the influencing agent, and not those of the person being influenced. By insisting in our theories and scientific writings that as long as a person is aware of a stimulus, then they are also aware of and intend (or consent to) the way it influenced them, we provide 'scientific' cover for all sorts of influence abuses -- such as fear appeals or scare tactics by politicians, scams by telemarketers, and also advertising aimed at unhealthy eating or drinking (see Naimi et al., 2016).

So definitions do matter, not only for doing better science, but also for bettering society. Emphasizing awareness of a stimulus instead of awareness of its effects causes psychological science to erroneously categorize many cognitive, motivational, and emotional processes. Furthermore, it may hinder progress in mapping our human blind spots, a scientific endeavor that allows people to know what types of stimuli and processes may impact their decisions and behaviors outside of their awareness. Such knowledge is essential in improving fairness and social justice, and helping people live their lives on their own terms, not someone else's.

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