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Misusing Concepts and Cognitive Crisis of Psychology

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Abstract

The goal of mainstream psychology today is cognitive: understanding the mechanisms of human mind. The method of cognitivism is instantiating mental concepts in the form of behavioral experiments. By presenting a linguistic analysis of cognitivism, this article argues that the goal and the method of cognitivism are unscientific. Cognitivists borrow mental concepts from language, and misuse their natural ambiguity to devise experiments. The results, however, can never satisfy the goal of understanding mental mechanisms. Due to this error, the widespread acceptance of cognitivism resulted in consequences such as the replication crisis and indifference to practical concerns. To save psychology from its cognitive crisis, we need to adopt an empirical and pragmatic methodology. A refined behaviorism has the potential to replace cognitivism and make psychology into a useful science.

Keywords: cognitive psychology, scientific psychology, philosophy of psychology, behaviorism, replication crisis

Misusing Concepts and Cognitive Crisis of Psychology

"What we are destroying is nothing but houses of cards and we are clearing up the ground of language on which they stand." —*Ludwig Wittgenstein* (1953)

Cognitivism is the notion that human mind is a system that is composed of subsystems such as memory, attention, learning, etc. The goal of cognitivism in psychology is to explain how the mental system works. Figures such as Herbert Simon, Ulric Neisser, Daniel Kahneman, George Miller, Philip Johnson-Laird, and Noam Chomsky were among early theorists and proponents of cognitivism that dominated scientific psychology since the middle of the 20th century (for a historical perspective, see Richards, 2010). The effect of cognitivism is not limited to psychology as it influenced researchers in various domains of investigation.

This article criticizes the idea of cognitivism by presenting following arguments:

- cognitivism is an assumption,
- the assumption of cognitivism is senseless,
- this senselessness opened the possibility of misusing concepts that led to the replication crisis and an indifference to practical concerns,
- to resolve this situation, we should avoid conceptual confusion and fruitless explanatory research, and
- a refined behaviorism has the potential to save the mainstream psychology from its status quo.

This article is in line with the renewed criticisms on mainstream methods in psychology and how the method is detached from the phenomena (e.g., Uher, 2021). However, we argue that

psychology's problem is rooted in the belief in cognitivism, and as such, we do not need complex analyses to understand the underlying causes of the psychology's problems. Additionally, although there have been valuable criticisms on cognitivism and its method (e.g., Edwards & Potter, 1992; Richards, 1989), we think prior works did not present the main problem of cognitivism in a clear and concise form. And most prior criticisms had scholastic and philosophical tones, written in lengthy books, and targeting only people with extensive experience and interest in the topic. We, on the other hand, have an earthly, urgent, and practical concern that aims to inform the mass audience. So, we tried to keep our language blunt, clear, and easy to interpret.

In the following section we first see how concepts should be used in technical and academic domains, and later, we contrast the norm of terminology with how cognitivism treats its key concepts. After establishing the misuse of concepts as the cognitivist method, we discuss the pernicious influence of cognitivism in psychology. Finally, to propose a solution to the current situation, we first briefly review the efforts that have been made so far to counter cognitivism. By showing the deficiencies of prior attempts, we propose a refined behaviorism as the solution for mainstream psychology.

Cognitivism as a Senseless Assumption

Cognitivism purports to be a scientific endeavor. As such, if the goal is understanding the mechanism of the mind, there should be observable representations of the mental mechanism. In other words, the mechanism must be located somewhere. Where is it located? Do scientists have any physical system at hand? No, there is no physical system to find its mechanism. Is there any

natural system, as those of biology or geology? No. Is there any social system, similar to the subject of economics? No. There is no empirical manifestation of the mental mechanism. Therefore, to be taken as a science, cognitivism is an assumption—the assumption that there *exists* a mental mechanism.

If the mental mechanism is not observable, what do cognitivists do in research? If they are scientists, what do they observe? They observe human behavior (e.g., eye movement, reaction time, choices). However, learning about human behavior is not their goal, as it was the goal of behaviorism. Rather, cognitivists try to know what is behind behaviors; what mechanism is causing and mediating them. With this goal, researchers use a mental concept (e.g., memory, attention, learning, etc.), instantiate the concept through an experiment, and measure participants' behaviors. It is from the behaviors that researchers infer the mechanism of memory, attention, learning, etc. This inference of the mechanism of the mind from behaviors is the key characteristic of cognitivism.

Because the very existence of the mental mechanism is an assumption, let us ask what the mental concepts are. When the subject matters of a cognitive research (i.e., memory, attention, learning, etc.) are not observable entities per se, they are concepts borrowed from language. To devise a research project, these concepts are instantiated by cognitivists in the same way as they are used in language. A memory researcher designs an experiment by instantiating the concept of memory in the same manner that we use memory in our daily conversation. But the result of an experiment, cognitivists argue, helps explaining the mechanism of memory. Now, in the absence of any observable mechanism, what cognitivists do in fact is to find the mechanisms of concepts.

Do concepts in language have mechanisms? No, concepts are used in language for communication, and are understood by communicating parties. Concepts are simply concepts. As a result, the cognitivist project of finding the mechanisms of the mind is senseless. The following paragraphs open the argument in further details.

The Logic of Using Concepts in Academic and Technical Domains

Language is the original home of concepts (Wittgenstein, 1953). For example, the concept of memory is used in language in situations that are about past events or recollections thereof—e.g., "walking down my childhood neighborhood made me see memories of the past" or "the scene has remained in my memory ever since". We all understand the concept of memory as used in these examples. Concepts, such as memory, can be borrowed from language and legitimately used as names of systems or scientific constructs. For example, computer scientists and engineers borrowed the concept of memory from language and used it as part of a name of an electronic system: computer memory.

When a set of concepts are borrowed from language and used by people within a field of study, they form a jargon—also known as terminology or technical language. A jargon is created, used, and understood by people within a professional field, and as such, is often not accurately understood by people outside of the field. In this way, concepts in a jargon are disconnected from their original meaning in language. When scientists and practitioners use a jargon, they are no longer concerned with the original meaning of key concepts in that jargon (Hirst, 2003). For this reason, in any jargon, we should be able to replace concepts of a jargon with different concepts or labels. For example, we can imagine a situation in which computer

scientists replaced the concept of "memory" with "leaf" (for another example, see Adamczyk, 2018). It is *possible* for scientists and technicians to accommodate themselves over time to use new concepts without difficulties in their experiments, models, or equations.

In short, there should be no necessary connection between the meaning and use of concepts in language and in a jargon. Indeed, if there was such a necessary connection, the jargon would not exist. From a practical standpoint, this is justified as the referents of concepts are often vague and ambiguous in language. Although this vagueness is necessary and useful in language (e.g., Ferrer i Cancho & Sole, 2003; Zipf, 1949), it is problematic for jargons. In using jargons, it is important to reduce the vagueness and increase the clarity of concepts. With this in mind, let us see how cognitivism behaves with its concepts.

The Logic of Misusing Concepts in Cognitivism

To start a research project, cognitivists think about the instances (or referents) of a concept in language. These instances are in the form of events and behaviors. For example, imagine while you are writing a sentence, your phone rings and distracts you from writing. This can be an instance of the concept "attention" as your attention was shifted from writing to the phone.

Then, an instance of a concept is chosen for an experiment. It is crucial to note that the instantiation of concepts is similar in language and cognitive research, as instances for research come from the use of a concept in language. For example, in Atkinson and Shiffrin's (1968) classic research, the concept of memory was instantiated when participants were instructed to remember the pairing of digits with letters, and later asked to remember the pairings. Indeed,

memory does not mean the pairing task; the task is an instance of the concept of memory as used in language.

After measuring participants' behaviors and analyzing the data, researchers make certain inferences from behaviors. Such inferences are used either to verbally explain the mental mechanism behind the behavior, or to depict a model thereof, as in Atkinson and Shiffrin's (1968) memory model. Finally, it is claimed that the model explains the mechanism—or part of the mechanism—of human memory. If such explicit statements are not made by researchers, similar goals are implicitly assumed and are the justification for the existence of the research.

Now we can put the experimental cycle in perspective and see how concepts are treated and used. At first, it is important to recognize that the meaning of concepts as used by the cognitive research is connected to their meaning in language. It was shown earlier that in any jargon, concepts should not be connected to their original meaning and should be replaceable with other concepts or labels. But can mental concepts be replaced with different concepts or labels? Suppose a conscientious cognitivist, whose goal was to know how memory worked, was willing to replace "memory" with "leaf". The first problem is to instantiate leaf in the form of a behavioral experiment. But how can the concept of "leaf" be instantiated for a behavioral experiment? It is obvious that the experimental cycle would halt from the outset. Therefore, it is not possible for cognitivism to replace their concepts with different labels, and due to the necessary connection in the meaning of cognitivist concepts with the same concepts in language, certain concepts (memory, attention, etc.) *must* be used in cognitivism.

The connection between the meaning of concepts in language and cognitive research is also evident in making final conclusions from experiments, as researchers argue that their model or explanation tells us how mental mechanisms work. For example, the result of the experiment on pairing digits and letters are not limited to that specific task, but is used to depict a model of human memory in general. So, from initiation to generalization, researchers use mental concepts the same way as they are understood in language.

Because of this connection, mental concepts never become technical concepts, and do not form a jargon. More importantly, this connection brings the ambiguity of concepts from language to the research practice. For example, as a result of this ambiguity of concepts, in one research, memory refers to pairing digits with letters (Atkinson & Shiffrin, 1968) and in another it refers to remembering a sequence of letters that participants heard earlier (Baddeley & Hitch, 1974). A subsequent cognitivist finds that remembering a list of auditory and visual digits with distractors, which in language is an instance of memory, is not explained by previous research, and presents a new explanation or model (e.g., Jones et al., 2004). This simple research paradigm, as the result of the ambiguity of a concept such as memory, established decades of cognitive research.

The core problem in the connection of meaning between language and research is that cognitivism uses the natural ambiguity of concepts in language to create a long list of experimental possibilities without any direction. In fact, instead of being a problem, the natural ambiguity of concepts in language became the engine of research for cognitivism. In other words, the connection in meaning is necessary for the survival of cognitivism as there would be

no instantiation and experimentation without the ambiguity of concepts. But do the amalgamation of the results of all the cognitive research on memory tells us about how the memory works? The answer is negative not because the evidence is incomplete, but because memory is a concept, and the goal of understanding the mechanism of memory is senseless. So, there can be no direction for the progress of research.

Concepts are either used in language as their original home for communication, or can be used in scientific or technical disciplines as part of a technical language. When used by cognitivists, mental concepts are not serving either of the two purposes. Goals such as "understanding how memory works" and "studying attention" are senseless because memory and attention are concepts, not mechanisms to be found or studied. From this line of argument it can be inferred that mental concepts are *misused* by cognitivists (for a relevant discussion on the topic, see Richards, 1989).

Implications of Cognitivism

The extent of the effect of cognitivism in psychology and other domains is more than what we can discuss here. In short, within psychology, other major sub-disciplines of psychology—i.e., developmental, social, and industrial and organizational psychology—accepted the premises of cognitive psychology and followed its method (see Edwards & Potter, 1992). And outside psychology—e.g., human factors and ergonomics, linguistics, communication studies—the cognitive method has had lasting impact, at least within academic circles and theories (e.g., Newell, 1990). Here, we focus on only two examples within psychology: replication crisis and indifference to practical concerns.

It has been shown that that the results of many psychological experiments were not reproduced by subsequent replication attempts, and this questioned the validity of the original results (e.g., Open Science Collaboration, 2015). This can be a direct outcome of misusing concepts because trivial differences (e.g., temperature of the experimental room) between two independent experiments that use the same research concept do not change the research concept but can influence participants' behaviors. The ambiguity of concepts provides researchers with the freedom to devise reproducing experiments that are different from their originals in contextual details, but nonetheless are attempting to reproduce their results. In other words, research concepts are the same, but changes in experimental settings induce different behavioral outcomes. Often, the only connection between an experiment and its replication attempt is that they both use similar concepts, and due to differences in contextual details of experiments, it is no surprise to see failures in replicating original results.

One might argue that this problem arises when researchers do not sufficiently control important variables in their experiments, and so, they proposed solutions such as documenting the experimental details and making it available to subsequent researchers. However, such proposals do not do much to solve the problem, as repeating an experiment with exactly the same experimental settings is not only infeasible, but would also make it impossible to generalize the results beyond the experimental settings. So, the replication crisis is a necessary characteristic of a cognitivist psychology.

Additionally, because cognitivism changed the research direction toward explanation—as opposed to direct observation—it downplayed the practical commitments of psychology. This

lack of practical commitment becomes evident by reviewing the mainstream psychology's literature over the last few decades until today; we can see basic questions in understanding human mind in recent research similar to those decades ago. This is simply because misusing concepts provides the possibility of using abstract experimental stimuli with no clear practical direction. For example, typical cognitive projects in attention use abstract stimuli such as letters, circles, color wheels, bars, and more recently, trees, houses, and natural images. However, there are no sufficient discussion of how the stimuli can be applied to a real-world use case. The fact that the experiment represents an instance of the concept "attention" is sufficient to justify the research. This brings us to the question of: how did the findings from cognitivism change the design of products, systems, curricula, regulations, or other state of affairs? If there were practical benefits, it was the result of behaviorist approaches (e.g., verbal protocol analysis: de Groot, 1965; Ericsson & Simon, 1980). Based on our knowledge, the evidence that would show the necessity of using cognitivism in practical domains is lacking. Examples of research topics that suffered from misusing concept are summarized in Table 1.

The Way Forward

Major Prior Attempts Against Cognitivism

In response to the problems of cognitivism, a number of authors proposed alternative methods and practices. For example, a group of researchers tried to establish *Discursive Psychology* to replace cognitivism (see Edwards & Potter, 1992; Potter, 2000). And as another example, the ecological psychology of Gibson (1966) and similar attempts are used as a foundation of a new proposal to replace cognitivism (see also Gregen & Gigerenzer, 1991; Still

& Costall, 1991; Leudar & Costall, 2009; for a more recent attempt, see Heras-Escribano, 2021). We think there are several major limitations to such attempts.

Table 1. *Examples of Project Topics, Approaches, and Theories that Suffer from Misusing Concepts*

Topic	Examples of studies	Error
Memory	(Atkinson & Shiffrin, 1968; Baddeley & Hitch, 1974)	Misusing concepts such as memory, forgetting, retrieval
Rational Analysis	(Anderson, 1990; Griffiths & Tenenbaum, 2005; Marr, 1982)	Assuming the truth of computational theory of mind; misusing concepts such as causal learning/reasoning
Feature Integration Theory	(Treisman & Gelade, 1980)	Misusing the concept of attention; assuming the computational theory of mind; rationalistic expectation of how attention *should* work
Creativity	(Simonton, 2000)	Misusing concepts such as creativity and problem-solving
Developmental Studies	(Gopnik & Wellman, 1992)	Assigning concepts such as attention or preference to certain behaviors of infants; assuming the existence of theory of mind
Judgment and Decision-Making	(Kahneman & Tversky, 1979)	Misusing concepts such as decision-making and rationality
Metacognition	(Flavell, 1979)	Assuming inner states as positive entities; misusing concepts such as consciousness
Structural Equation Modeling	(MacCallum & Austin, 2000)	Characterizing unobservable entities and their mechanisms (e.g., intelligence quotient, personality) from observations

Note. Because of the extensive effect of cognitivism, creating a comprehensive list was outside of the scope of this article. So, Table 1 shows only a few prominent examples.

First, theories such as discursive psychology are in essence philosophical (e.g., Wittgensteinian philosophy), and philosophers either do not speak the language of psychologists, or are frowned upon by psychologists. Although there have been efforts to relate those philosophical arguments to concerns of mainstream psychology, it is difficult to establish a whole new paradigm for psychology based on certain philosophical traditions. This is particularly important as the recent history of psychology shows the reluctance of psychologists to accept criticisms and adopt paradigms that come directly from philosophy (see the reactions of cognitivists to philosophers like John Searle and Hubert Dreyfus).

Second, if the proposed alternatives are novel and not practiced by psychologists in wide scale—as was the case for Discursive Psychology—there are due skepticisms in its adoption by mainstream psychology. A cursory look at such prior alternatives shows the focus of authors on limited topics in psychology (e.g., linguistic development, ethnomethodology), and this is deemed insufficient by psychology as a vast domain.

So, although there were courageous prior attempts to replace cognitivism, due to these and other limitations, it is not an overstatement to say their success was at best limited. This is particularly noteworthy as more than three decades have passed since the formulation of attempts such as discursive psychology. A look at today's mainstream psychology shows that, despite what some authors assumed to be the end of cognitivism (e.g., Potter, 2000), psychology is still predominantly cognitivist. In response to the limitations of prior attempts, we think:

- philosophical arguments should only be used to criticize cognitivism, as well as psychological methods in general. Certain philosophical traditions cannot be used as

methods of psychology, at least without extensive refinements to make them readily used by mainstream psychology. And,

- any proposed alternative—or at least certain aspects of it—should have been widely used and tested before being adopted in large scale by mainstream psychology. It is only in this way that psychologists can be assured of possible future directions of the field.

In short, prior criticisms of cognitivism and alternative proposals were too abstract, philosophical, and limited to have tangible impact on the practice of psychology. Therefore, we think we should propose a method that both speaks the language of psychology, and is widely-known and extensively practiced for decades before cognitivism: behaviorism.

A Refined Behaviorism

From early 20th century until about 1970s, behaviorism dominated the American scientific psychology (Thorndike, 1898; Watson, 1913). The goal of behaviorism was to understand how observable behaviors were caused by external stimuli. Thus, behaviorists rejected mental concepts in research, and this eliminated the possibility of misusing concepts.

Behaviorism arose in line with the evolution of the Western thought; it was empiricist and pragmatic, as opposed to introspection and cognitivism that were rationalistic and explanatory (see Richards, 2010). However, behaviorism ran out of favor for reasons such as the growth of computers and the idea of artificial intelligence, inability to answer *why* humans behave the way they do (Mandler, 2002), and the excessive emphasis from the late behaviorists on reducing many phenomena of human behavior to a simple input-output schema (Skinner, 1938).

Nonetheless, we think if there is any science in—or practical result from—psychology, it must essentially be behaviorist simply because it is the behavior that is observable and can have practical effects. In practice, cognitivism is nothing but a behaviorism that is used largely in useless directions and with senseless stories and interpretations of the results. For mainstream psychology, this can make the adoption of behaviorism easier than unpracticed and unfamiliar methods such as Discursive Psychology. Psychology is behaviorism; otherwise, it can never be a science. So, we think we can retain useful aspects of behaviorism without extending its limits to subjects outside of pragmatic values. And the key aspect of behaviorism to retain is its emphasis on observation as it prevents misusing concepts and attempts at deriving mental mechanisms.

Our proposal is to refine behaviorism by freeing it from its mistakes, and retaining its basic principles. This behaviorism will no longer suffer from these traditional problems of behaviorism:

- trying to reduce human behavior to the input-output (i.e., stimulus-response, or reward and punishment) paradigm and conditioning,
- trying to extend the subject of investigation to ethical issues such as free-will and determinism and controlling behaviors,
- rejecting behavioral structures that exist a priori and are resulting from evolution (e.g., language acquisition), and the resulting overemphasis of the importance of learning in explaining behaviors, and
- putting too much emphasis on individual without considering the contextual elements of the environment (e.g., social settings, surrounding tools).

The new behaviorism would retain these behaviorist principles in its investigations:

- rejecting mental concepts in initiating research and making conclusions,
- avoiding attempts at deriving mental mechanisms and models,
- being specific (not general) in making conclusions from research,
- and, rather than "basic" research, choosing real-world problems and questions to address.

In short, having a pragmatic goal in research would guide the research toward soundness, and prevents the senseless misuse of concepts. A refined behaviorism has the potential to salvage psychology from a mythical practice into a useful science that would aim to resolve the problems of practical significance.

Discussion

This section first answers the possible arguments that might be brought by readers, and later, concludes the message of the article.

Arguments

One might argue that a large part of cognitive psychology is "basic" science, and therefore, it is not intended to have direct practical uses. But let us think about the reason of basic science: increasing human knowledge and understanding. But if that knowledge remains knowledge without any practical effect, what is the reason of its existence? It definitely does not serve spiritual or ethical goals. And what is the difference between that "knowledge" and, say, superstition? The ultimate reason for any academic and scientific investigation is to have practical effects.

If we accept this, another argument might claim that investigations in cognitive psychology can have, or could have had, practical significance, and it is not always easy to determine practical effects of a line of research. This is a justified argument. However, if we accept this viewpoint, the consequence would be to remove the principles and criteria of whether an investigation is worthy of attempting. In that case, any human activity might have practical consequences regardless of how it is done. But should we accept research for anything, conducted in any manner? If not, the results of an investigation must be directly applied and tested for practical ends in some way or other. Judging by immediate practical effect would not only allow the evaluation of investigations, but would also eliminate the possibility of useless research.

Some cognitivists might agree with these criticisms, but would argue that they are improving the research practice in their area. For example, they reduced the extent of generalization of their results, made their data publicly accessible, or invited the replication of their results. But, as long as concepts are being misused and goals are cognitive (i.e., inferring mechanisms or explanation), these attempts do not solve the main problem in the nature of questions and research. How can these attempts improve the research practice in understanding the mechanisms of memory? The goal of the project, per se, is erroneous.

It was argued earlier that one of the main detriments of cognitivism is in lacking an observable object of investigation. But one can argue that cognitivists do have an observable system at hand: the brain. So, the evidence in cognitivism does not only come from behavioral experiments, but can also include neural data. Now, it is crucial to remind ourselves of the goal

of cognitivism, and ask: how the data from neural activities can help explaining mental mechanisms? How can we possibly know the mechanisms of memory functions from brain recordings (as has been practiced for years)? The parallel activation of certain brain regions with certain behaviors can never explain the mental mechanism of those behaviors simply because it does not provide information in addition to those behaviors (see Poldrack, 2006). As a result, cognitivists should either solely use behavioral experiments, or should aim to understand the mechanisms of the brain. But is the goal of cognitivism understanding the mechanisms of the brain? Brain is a biological system and studying its mechanism is a topic in biology. The interest of cognitivists, however, is not to understand how the brain works, but how the mental system works. Because of these reasons, counting brain as an observable entity cannot make cognitivism into a science.

Historical Roots

Because it can help us to put the argument in a broader perspective, let us briefly remind ourselves of the evolution of philosophical thought concerning the subject of our discussion. So, the next few paragraphs describe the post-renaissance philosophy regarding psychology.

The first important post-renaissance school of thought was rationalism in which thinkers arrived at the truth of propositions by thinking. The criterion of truth was its correspondence with human reasoning, and observations were used as evidence to infer entities beyond observation (e.g., God). The proliferation of mysticism and applying it to practical affairs led to the growing resentments with rationalism.

What followed rationalism was empiricism that led to positivism and similar philosophical systems that emphasized the primacy of observation over reasoning and thinking. What was observed was the "truth" and beyond that nothing could be inferred. However, the reason that empiricism and positivism was not universally adopted by thinkers was its inherent problems and flaws resulting from the skepticism to observation (e.g., Hume, 1969/1739) as well as its inability to provide grounds for morality. Additionally, positivists' attempts to standardize the scientific method was not welcomed by all scientists and thinkers. This led to a difficult and important question of how we can differentiate a sound science from meaningless and unsound practices and research.

To resolve this difficulty, a group of thinkers decided to replace the soundness and logical coherence with practical values. In rough terms, to avoid the difficulties of settling rationalism with empiricism, they argued it did not matter whether an investigation made sense as long as it had practical benefits. This approach was known as pragmatism (Dewey, 1960; James, 1977/1898; Peirce, 1958/1877). In fact, pragmatism provided a remedy to the difficult question of philosophy by replacing "truth" with use and practical value; any investigation with direct practical benefits was worth the effort.

Applying pragmatism to psychology produced behaviorism. The behaviorist program for psychology was to concern researchers with questions of practical importance, and because of this, behaviorism denounced using mental and cognitive concepts that baffled philosophers for centuries.

In line with pragmatism, probably the last important philosophical school of thought was linguistic philosophy, formulated by thinkers such as Wittgenstein (1953) and Ryle (1949). Linguistic philosophers—together with most of their predecessors that came after rationalism—rejected mental mechanisms and processes, and emphasized the importance of a pragmatic psychology that focused on practical topics such as training and use-based analysis of language and behavior.

Now, consider cognitivism and its rationalistic—or Cartesian—tendency to infer unobservable entities (i.e., mental mechanisms) from observations. Why did we reject the latest philosophical achievements (i.e., pragmatism and linguistic philosophy) and their result in psychology (i.e., behaviorism)? No reason is provided from cognitivists in answering why we should turn our back to the history and evolution of the Western thought and adopt a rationalistic method (for a video discussion, see Manufacturing Intellect, 2017).

Conclusion

By misusing concepts, the cognitive method has turned most of today's psychology into senseless and useless activities. In answering the why question of human behavior, many researchers over the last few decades have fallen into the trap of misusing concepts. And we, as the authors of this article, have not always been immune to misusing concepts, as some of our past works are suffering from this error. Nonetheless, the hope is to recognize such pseudoscientific practices, and prevent further loss of our time and resources. In making psychology into a valuable science, we need to avoid using mental concepts and adopt a refined behaviorism that would lead to solutions of practical values.

Although the subject of this article is cognitivism—i.e., cognitive psychology and cognitive science—other academic and scientific domains are not immune to misusing concepts. How to recognize what academic practices are suffering from this error? This article is not trying to offer universal solutions, but with respect to our discussion, the pragmatic question can dissipate the conceptual confusion: how does the research change anything in the practical world, especially in short terms? And concepts in research statements and jargons should have referents such as observable systems, characteristics, objects, etc. As such, for any research statement, we need to ask: What do key concepts refer to? In the case of cognitive studies, the answer was: nothing.

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