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Concepts as Pluralistic Hybrids

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Concepts as Pluralistic Hybrids

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Abstract. In contrast to earlier views that argued for a particular kind of concept (e.g. prototypes), several recent accounts have proposed that there are multiple distinct kinds of concepts, or that there is a plurality of concepts for each category. In this paper, I argue for a novel account of concepts as pluralistic hybrids. According to this view, concepts are pluralistic because there are several concepts for the same category whose use is heavily determined by context. In addition, concepts are hybrids because they typically link together several different kinds of information that are used in the same cognitive processes. This alternative view accounts for the available empirical data, allows for greater cognitive flexibility than Machery's recent account, and overcomes several objections to traditional hybrid views.

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1. Introduction.

The nature and origin of concepts is a long-standing topic within the philosophy of mind. In this paper, I argue for a novel account of concepts as pluralistic hybrids. This account is able to combine the best features of hybrid views (Anderson and Betz 2001, Gelman 2004, Osheron and Smith 1981) with the key insights of concept pluralism (Weiskopf 2009a, 2009b).

In contrast to earlier views that argued for a particular kind of concept (e.g. prototypes), several recent accounts have proposed that there are multiple distinct kinds of concepts (Machery 2005, 2009) or that there is a plurality of concepts for each category (Weiskopf 2009a, 2009b). For example, in *Doing Without Concepts* Edouard Machery argues that we ought to eliminate the term 'concept' from psychological theorizing and instead investigate the fundamental kinds of

concepts and the distinct cognitive processes that operate on them (Machery 2009).[1] On Machery's view, there are multiple kinds of concepts—including prototypes, exemplars, and theories—and these kinds are each processed (at least in most cases) by distinct cognitive processes. While I agree with Machery's (and others') rejection of the common assumption that concepts form a homogeneous class (or natural kind), I disagree with the positive view he offers in its place.

In order to motivate my alternative account, I will begin by raising two objections to Machery's view. First, I will argue that there are no default bodies of knowledge used in (most) higher cognitive processes. Second, I will argue that there is no reason to suppose that there are distinct higher cognitive processes for each kind of conceptual information.

Then, in light of these points, I will present my alternative account of concepts. Rather than dividing into distinct kinds each involving a particular kind of conceptual knowledge and a distinct set of cognitive processes, I will argue that concepts are *pluralistic hybrids*. They are pluralistic because there are several co-referential concepts for the same category and which conceptual information we use is highly context-sensitive. In addition, I maintain that concepts are hybrids that typically link together several different kinds of conceptual information. These pluralistic hybrids are then used as inputs in the same cognitive processes.[2] This alternative view accounts for the available empirical data showing that, (1) our cognitive processing involves several concepts for the same category, (2) multiple kinds of conceptual information are often used by the same cognitive processes, and (3) the conceptual information used is highly adaptive to contextual factors. Furthermore, the pluralistic hybrid view has the advantage of allowing for greater cognitive flexibility than Machery's view by placing the integration of different types of conceptual information before their use by our higher cognitive processes. Finally, the pluralistic hybrid view overcomes the objections I raise to Machery's account and the objections Machery raises to traditional hybrid views of concepts. As a result of these empirical and theoretical motivations, we ought to adopt the pluralistic hybrid view and investigate the largely unexplored avenues for future research it suggests.

[1] I focus on Machery's view because of its clarity and its recent influence.
[2] Although there are likely multiple processes for many conceptual tasks, I will argue that these are not dedicated to a single kind of conceptual information.

The following section presents Machery's Heterogeneity Hypothesis. Then Section 3 raises two objections to Machery's view. Section 4 presents the pluralistic hybrid view of concepts. Next, Section 5 argues for the pluralistic hybrid view by discussing the need to account for cognitive flexibility. Section 6 responds to several objections to traditional hybrid views. Finally, Section 7 proposes avenues for future research suggested by the pluralistic hybrid view.

2. Machery's View.

Machery's account depends on his Heterogeneity Hypothesis, which consists of the following five tenets (Machery 2009, 75):

> (1) The best available evidence suggests that for each category of objects, an individual typically has several concepts.
>
> (2) These co-referential concepts have very few properties in common; i.e. they form distinct kinds. They store different types of knowledge and are used in different cognitive processes.
>
> (3) Prototypes, exemplars, and theories are among these different kinds of concepts.
>
> (4) Prototypes, exemplars, and theories are typically used in distinct cognitive processes.
>
> (5) As a result, the notion of 'concept' ought to be eliminated from psychological theorizing.

In this paper, I will grant (1) and I will have little to say about (5). Instead, my focus will be on tenets (2), (3), and (4). I will argue that although there are good reasons to accept concept pluralism (for each category an individual typically has several concepts) the case is rather thin for thinking that concepts divide into distinct kinds (e.g. prototypes) that are used by default in distinct processes dedicated to those kinds (e.g. the categorization process for prototypes). However, before making my case against (2), (3), and (4) we need to look at these tenets in greater detail.

2.1. Three kinds of concepts that are used by default.

Following psychologists' use of the term, Machery proposes that concepts are "bodies of knowledge that are used by default in the processes underlying the higher cognitive competences" (Machery 2009, 29). This definition implies that a theory of concepts ought to

describe the kind of information stored in concepts and the way they are used within higher cognitive processes.

Concepts include only a subset of our whole knowledge stored in long-term memory. On Machery's view, the knowledge that is constitutive of a concept is the knowledge that is *retrieved by default* from long-term memory when we reason, categorize, etc. about a category (Machery 2009, 11-12).[3] The rest of our knowledge about the category is "background knowledge" that is not retrieved by default and so is not part of our concept(s)—although it may also be retrieved for certain cognitive tasks.

Within the literature, concepts have been identified with prototypes (Rosch 1978; Rosch and Mervis 1975; Smith and Minda 2002), exemplars (Juslin and Persson 2002; Medin and Schaffer 1978; Zaki and Nosofky 2004), theories (Carey 2000), ideals (Barsalou 1985), amodal atomic symbols (Dove 2009; Fodor 1998), and perceptual representations (Barsalou 1999; Prinz 2002). This literature has been built on the assumption that concepts constitute a homogenous class; i.e. that they form a natural kind.[4] Unfortunately, none of these theories has proved to be completely satisfactory—i.e. no theory is able to account for all the available data. This suggests that the assumption that concepts form a single unified kind is mistaken (Machery 2005, 2009; Weiskopf 2009a).

In response, Machery proposes that there are at least three distinct kinds of concepts: prototypes, exemplars, and theories. According to prototype theories, concepts are prototypes that store statistical information about the properties that tend to be possessed by (or are highly typical of) the members of the category (Rosch 1978; Rosch and Mervis 1975; Smith and Minda 2002). In contrast, exemplar theories propose that concepts consist of sets of stored representations of particular category members (Medin and Shaffer 1978; Nosofsky 1988, 1991; Juslin and Persson 2002). Finally, the theory view of concepts claims that concepts are similar to

[3] As Machery explains: "The knowledge that is stored in a concept of x is preferentially available when we think, reason, and so on, about x. So to speak, it spontaneously comes to mind. By contrast, the knowledge about x that is not stored in a concept of x is less available—it does not spontaneously come to mind. The knowledge that is not stored in a concept of x is used only when the knowledge that is stored in this concept is insufficient or inadequate for the task at hand. In such cases, people access their long-term memory in order to retrieve some additional knowledge about x that helps them deal with the task at hand" (Machery 2009, 11-12).

[4] For the purposes of psychological theorizing, the key feature of natural kinds is that they are properties (or clusters of properties) about which scientifically relevant generalizations can be formulated.

scientific theories (Murphy and Medin 1985; Gopnik and Meltzoff 1997). These theories store nomological, causal, modal and functional generalizations about the category.

On Machery's view, a single category will have a variety of co-referential concepts that have very few properties in common; i.e. they form distinct kinds. These distinct kinds of concepts—namely prototypes, exemplars, and theories—store different types of knowledge and are used in higher cognitive processes for induction, categorization, etc. (Figure 1).

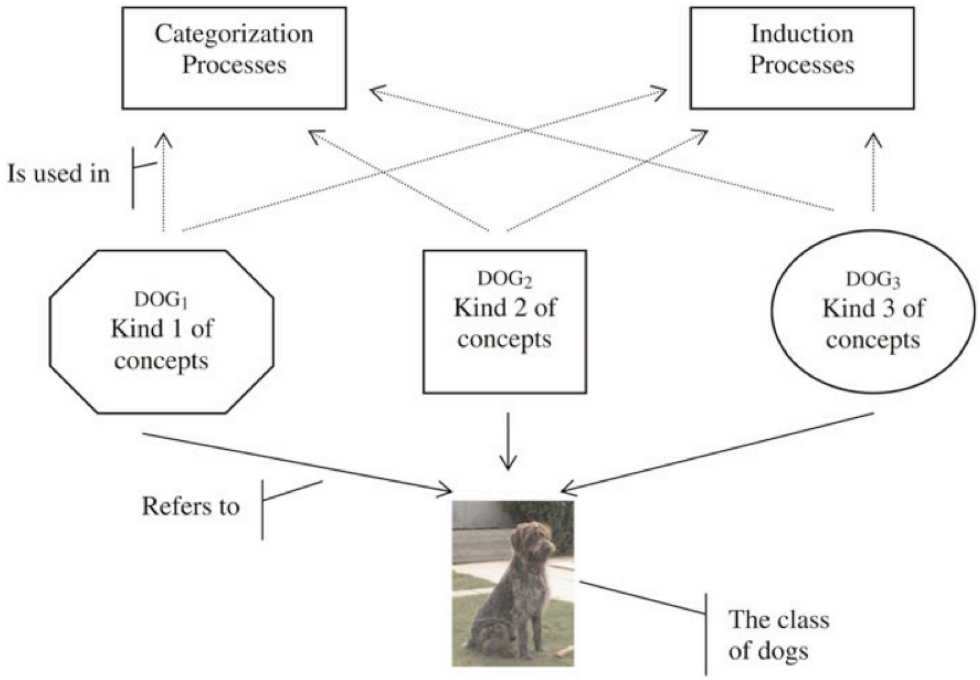

Figure 1: Machery's heterogeneity hypothesis (Machery 2009, 60).

For example, an individual will have several dog concepts, each of which belongs to a particular kind of concept. Machery argues that these kinds of concepts have little in common because they each store fundamentally different kinds of information. In sum, Machery's view requires: (1) that we have specific bodies of knowledge *that are used by default in our cognitive processes* and (2) that these bodies of knowledge *divide into different kinds that have little in common* (Machery 2005, 452).

2.2. Distinct processes for each kind of concept.

In addition, Machery contends that we have multiple higher cognitive processes each defined over a fundamental kind of concept—e.g. prototypes, exemplars, and theories (Machery 2005,

2009). For example, "each fundamental kind of concept is used in a distinct categorization process. That is, we have several categorization processes, each defined over a fundamental kind of concept. The same is true of several other competences" (Machery 2009, 61). In other words, we have several categorization processes, several induction processes, etc., each of which uses a distinct fundamental kind of concept (see Figure 2).

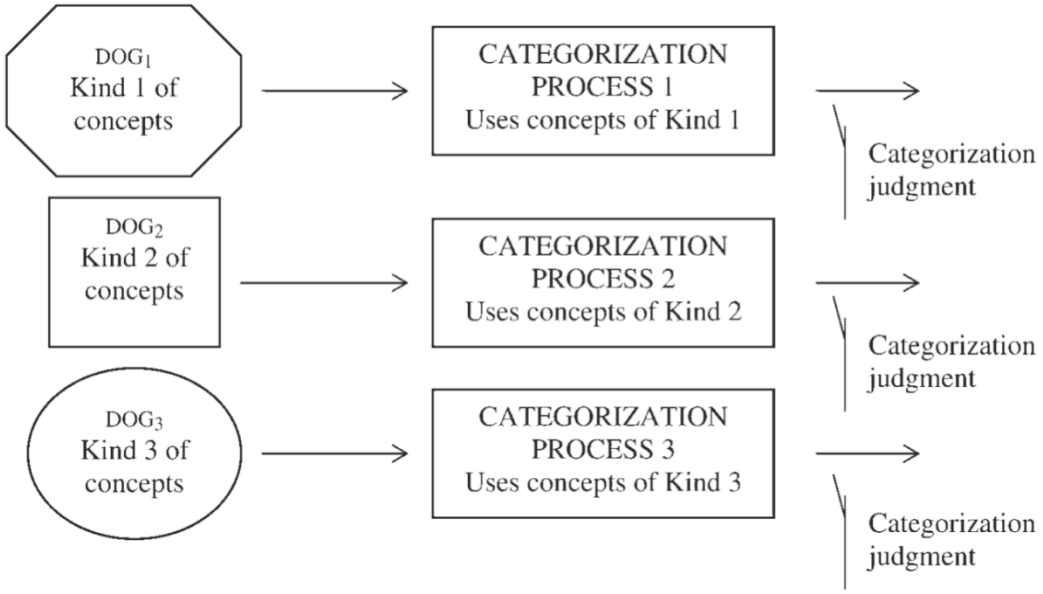

Figure 2: Three kinds of categorization processes that use distinct kinds of concepts (Machery 2009, 61).

Machery's main motivation for adopting this view of cognitive processes draws on the fact that different theories of concepts posit functionally different kinds of processing (Machery 2009, 119).[5] As an example we can consider categorization. According to prototype theories, categorization involves comparing the properties of an experienced object with those stored in various prototypes.[6] Exemplar theories also rely on similarity for categorization, but differ in that experienced objects are compared with the properties of stored exemplars rather than prototypes. In contrast, theory theorists propose that categorization involves various forms of scientific reasoning; e.g. inference to the best explanation.[7] As a result, Machery argues that each of these theories proposes a fundamentally different kind of process for categorization that uses a

[5] That is, like the distinct kinds of concepts, the processes posited by prototype, exemplar, and theory theories of concepts have little in common.
[6] An object is categorized by determining the prototype it is most similar to. For example, a dog will be categorized as a dog because its properties are most similar to the properties of the dog prototype.
[7] For example, we might infer that the best explanation of our experience(s) is that the object is a dog given our stored theoretical knowledge about dogs.

different kind of conceptual information—the same goes for various other higher cognitive competences.

3. Two Objections to Machery's View.

Having outlined the tenets of Machery's positive view, I now raise two objections. First, I will argue that there are no default bodies of knowledge used by (most of) our higher cognitive processes. Second, I will argue that there is no evidence in support of the existence of distinct cognitive processes for each kind of conceptual information.

3.1. There are no default bodies of knowledge used by our higher cognitive processes.

One problem for Machery's claim that concepts are the bodies of knowledge used by default by higher cognitive processes is that the conceptual information that comes to mind spontaneously is heavily influenced by frequency of association and the current context. Among other things, the conceptual information we use in our higher cognitive processing is heavily influenced by myriad factors from our social, linguistic, and physical context (see Casasanto and Lupyan forthcoming for a nice review). Most (if not all) situations in which we draw up conceptual information will tailor that information to the context and task at hand. For example, if one is looking for a ball at Yankee Stadium, one is likely to use a very different set of conceptual information than if one is searching for their child's soccer ball before practice. Indeed, this is an extremely useful and widely observed feature of our cognitive processing. When we encounter novel situations, or (perhaps novel) category members with diverse properties, we can tailor the conceptual information used in our cognitive processing to the particular cognitive task and situation. For familiar categories, such as dog, most of us will have a wide array of conceptual information including prototypical information, stored exemplars, and theoretical knowledge about dogs. However, these representations will certainly be used "spontaneously" in response to different sets of situations in the world (Rice 2013).

Indeed, there is a large amount of experimental evidence showing that, in most cases, the context of our cognitive processing will bring different properties, representations, and theoretical knowledge to mind spontaneously for the same category (Barsalou 1982; Casasanto and Lupyan forthcoming; Godden and Baddeley 1975; Rother and Shoben 1983).[8] Other studies

[8] Moreover, it appears that we can only isolate the conceptual information that is used spontaneously independent of the context in highly artificial situations in the lab.

have shown that the conceptual information used is highly dependent on the *task* at hand. For example, some studies have shown that individuals will depart from relying on prototypical information when they are asked to categorize counterfactual instances (Keil 1989; Rips 1989). In addition, Malt (1989) found that individuals could be induced to rely on exemplar or prototypical knowledge by changing the cognitive task or the structure of the category members. Finally, Whittlesea et al. (1994) showed that the kind of information individuals used depended on the way in which category members were presented (side-by-side vs. in a column).

This data suggests that we use and weigh various kinds of conceptual information differently in different contexts, but it does not require that we postulate distinct concepts for each kind of knowledge that are used by default in higher cognitive processing. Instead, the data merely shows that the kind of conceptual information used by our cognitive processes, and how that information is used, *is highly adaptive* to the particular task, category, and context at hand (Weiskopf 2009a). Indeed, in light of the empirical data, some psychologists maintain the extreme view that *all* concepts are constructed *ad hoc* such that no two instantiations of the "same" concept are exactly alike (Casasanto and Lupyan forthcoming). This suggests that there are no bodies of knowledge that are consistently used by default in our higher cognitive processes.

Machery responds to such context-sensitivity by arguing that some variability can be accounted for by recognizing that we sometimes retrieve background knowledge and that the body of knowledge retrieved by default can be tailored to the context. However, this is just to allow that frequently the representations used in higher cognitive processes include different information (i.e. that not included in the default knowledge) and that the information used in those processes changes with context.[9] In fact, the use of conceptual information that is sensitive to the context, task, and category at hand appears to be the *rule* rather than the exception. Therefore, contra Machery's view, it is unlikely that there are default bodies of knowledge that are only sometimes supplemented by background knowledge. Indeed, instead of supporting the view that there are widely used default concepts that divide into distinct kinds, the available evidence only provides a strong case for *concept pluralism*: concepts are constituted by multiple

[9] Even though for some concepts particular pieces of information may always be spontaneously retrieved; e.g. stinks when thinking about skunks (Barsalou 1982), this does not entail that there is a distinct default body of knowledge of a certain type that is used in most cognitive processing.

kinds of conceptual information, with the kind of conceptual information used being determined by context (Weiskopf 2009a, 2009b).

What is more, given that our cognition is *highly* context sensitive, I see no reason to privilege more context-invariant knowledge within psychological theorizing over knowledge that is used more sparingly.[10] Moreover, any threshold of frequency of use for inclusion in the concept would seem to be set arbitrarily. In other words, there is no principled reason for drawing a "line in the sand" concerning frequency of use (or access) in order to determine what knowledge ought to count as part of a concept and what ought to be left out. Indeed, the available empirical data suggests that the conceptual knowledge we use is highly adaptive to the context, task, and category. This makes it rather implausible that an arbitrarily drawn threshold concerning frequency of use is going to mark a meaningful theoretical distinction between default bodies of information and background knowledge.

Finally, it is unclear that prototype, exemplar, and theoretical knowledge could even in principle be distinguished into separate default concepts in the way required by Machery's view (Malt 2010). For one thing, prototypes are often taken to be *abstracted from* representations of stored exemplars. Moreover, according to several theory theorists, both prototypes and exemplars are *integrated within* our theoretical knowledge about a category (Murphy and Medin 1985). So rather than being easily dissociable kinds of information, prototype, exemplar, and theoretical knowledge are often intertwined and interdependent within long-term memory. This makes it difficult to see how there could be three distinct kinds of concepts that store different types of information and are called up separately. Rather than being clearly delineated, it is more likely that these different kinds of conceptual information are integrated (or blurred together) within long-term memory and our higher cognitive processes.

3.2. Cognitive processes are not dedicated to a single kind of conceptual information.

In addition, Machery fails to provide convincing evidence that the information involved in prototypes, exemplars and theories is used by default in *distinct* cognitive processes. Instead, the available data is consistent with an alternative hypothesis: our higher cognitive processes use *all*

[10] Casasanto and Lupyan (forthcoming) also raise this objection to attempts to distinguish between conceptual "cores" and their "periphery".

of these kinds of conceptual information (often simultaneously)—although different processes and contexts will deem different conceptual information more or less salient.[11]

First, we can consider categorization. While there is a large body of evidence that prototypical information is often relied on for categorization (Rosch 1975; Rosch and Mervis 1975; Hampton 1979), there is also plenty of empirical data on the importance of exemplar information for explaining categorization judgments (Medin and Schaffer 1978). In addition, there is lots of research showing that categorization judgments do not always depend on similarity, but sometimes rely on modal or causal knowledge of the kind stored in theories (Rips 1989; Smith and Sloman 1994; Ahn et al. 2000; Rehder 2003).[12] Consequently, the evidence strongly suggests that multiple kinds of conceptual information are used in categorization. However, the fact that these different kinds of information are all involved in categorization does not entail Machery's claim that there are distinct categorization processes for each kind of information. Rather, the data is consistent with our categorization processes being able to *use* various kinds of conceptual information—although different categorization processes might weigh that conceptual information differently. Indeed, such hybrid models of categorization have been proposed in the literature to account for the empirical data—e.g. see Anderson and Betz (2001).

As a second example, consider concept combination. Concepts can combine productively and systematically to form "complex" concepts about categories for which we do not have concepts stored in long-term memory (Fodor 1998; Fodor and Lepore 2002). Hampton (1987) demonstrated that there was a correlation between the properties that are judged to be typical of the members of the constituents' categories and the properties that are judged to be typical of the combined category. This suggests that during concept combination complex concepts often *inherit* properties that are prototypical of their constituents (Hampton 1997). Indeed, Hampton's (1987, 1988, 1996) work on concept combination strongly suggests that complex concepts are constructed in part by using prototypical information stored in long-term memory.

[11] Machery in fact admits that the data is inconclusive between these two hypotheses and suggests future research should focus on how these systems are organized.

[12] In addition, there is empirical data suggesting that for ad hoc concepts—e.g. ways to make friends—categorization judgments are better predicted by similarity to category *ideals* (Barsalou 1983, 1985).

In addition, complex concepts often involve properties that are not prototypical of their constituents, but are derived from our *theoretical* knowledge about the constituent categories—e.g. our modal and causal knowledge about those categories. (Medin and Shoben 1988; Rips 1995; Johnson and Keil 2000). For example, necessary properties of the constituents are always included, while impossible properties never are. Moreover, the causal relationships between properties influences how often they are included in a complex concept.

Finally, many complex concepts include what are called emergent properties: properties not included in either of the constituent concepts (Kunda et al. 1990). A common explanation of these emergent properties is that concept combination uses exemplar knowledge of members of the complex category to derive various additional properties of the complex concept (Hampton 1987; Medin and Shoben 1988). For example, if I know a Harvard graduate who is a carpenter, I might transfer some knowledge from my stored exemplar(s) of that individual into my complex concept for that category. Therefore, as Machery himself argues, the empirical evidence suggests that concept combination involves all three kinds of knowledge involved in prototypes, exemplars, and theories (Machery 2009, 207-212). However, as before, this result merely supports the claim that each of these kinds of knowledge are involved in conceptual combination, not that they can be divided into distinct kinds of concepts that are used separately as defaults in concept combination.[13]

In light of the evidence presented here, I conclude that most higher cognitive processes are capable of using each of these kinds of conceptual information—and often do so simultaneously. The available empirical data implies that various kinds of information are used by our higher cognitive capacities, including prototypical, exemplar, and theoretical knowledge. Moreover, there is no empirical evidence suggesting that these kinds of conceptual information are processed separately by distinct cognitive processes.[14] Rather, the evidence is consistent with (and somewhat supportive of) the view that these kinds of information are processed simultaneously by the same cognitive processes for categorization, combination, reasoning, etc.

[13] A third example is the reasoning system(s). As Machery himself notes, there is evidence that suggests that our reasoning systems use exemplar representations (Osherson et al. 1990) *alongside* prototypical information (e.g., Osherson et al. 1990) and theoretical information (e.g., Keil and Wilson 2000). For the sake of space, I do not review this evidence here.

[14] Indeed, see Virtel and Piccinini (2010) for reasons to doubt the evidence suggested by Machery.

What is more, such hybrid systems would not only be able to explain the available data, but would presumably be beneficial since different kinds of information could then be linked and processed simultaneously. This would allow a single process to use that diverse array of conceptual information more effectively than if different kinds of information had to be processed separately. Indeed, several reasons can be given for thinking that our various cognitive systems—e.g. inductive reasoning—would greatly benefit from the ability to process each of these kinds of conceptual information simultaneously. So while Machery is correct that having multiple kinds of information involved in our cognitive processing is required to explain the available data, a more effective cognitive architecture is one in which those kinds of information can be linked together in context-sensitive ways and then *processed simultaneously within the same higher cognitive processes.*

These objections point to a more general concern regarding the evidence cited by Machery in support of the Heterogeneity Hypothesis. Namely, the fact that individuals make use of different kinds of information in various cognitive tasks does not support the claim that concepts divide into kinds that each involve only one kind of information; nor does it show that there are distinct cognitive processes for each kind of information. Instead, the data is consistent with (and somewhat supportive of) there being multiple kinds of conceptual information that are linked together and processed by the same cognitive processes.

4. An Alternative View: Concepts as Pluralistic Hybrids.

In response to the above considerations, I propose that concepts are *pluralistic hybrids*. They are pluralistic because there are several co-referential concepts for the same category and which information is included in a concept (and which information is most salient within that concept) is context-sensitive (Weiskopf 2009a). That is, the combination of information that constitutes a concept will change depending on the particular cognitive task, context, and category. According to this view, there are no default bodies of knowledge that are consistently called up by our higher cognitive processes. Rather, different kinds of information are used depending on the particular category being represented, the particular cognitive task being performed, and the particular context the agent is in. Our long-term memory stores a vast array of conceptual information including prototypical information, stored exemplars, theoretical information, ideals, etc. Parts of this stored information are then called up and linked together "on the fly" for use in

various cognitive tasks. These linked subsets of information are concepts because they are the representations that play the roles we traditionally associate with concepts, but precisely what information is included in a concept is highly variable and depends on the context.[15] According to the pluralistic hybrid view, instead of statically existing fully formed within long-term memory, concepts are context-sensitive constructions built out of the network of information stored in long-term memory. These constructions are typically tokened within working memory, but may also be used in cognitive processes that do not involve working memory.[16] As Casasanto and Lupyan put it, "Rather than a process of accessing a pre-formed package of knowledge, instantiating a concept is always a process of activating an ad hoc network of stored information in response to cues-in-context" (Casasanto and Lupyan forthcoming, 6).

In addition, I maintain that concepts are hybrids that typically involve multiple different kinds of conceptual information. In other words, in agreement with traditional hybrid views (e.g. Osheron and Smith 1981), I argue that concepts are constituted by several "parts" that store distinct types of knowledge. On this view, concepts typically link (or perhaps blend) some combination of various kinds of knowledge stored in long-term memory, including prototypical, exemplar, and theoretical knowledge. However, contra Machery's view, I argue that these different kinds of information are typically linked together in a variety of ways *within a single hybrid concept*. Moreover, the links involved in a particular concept will (like the information included) depend heavily on the category being represented, the cognitive task being performed, and the context the agent is in. In addition, I place no restriction on the kinds of information that might be included in a pluralistic hybrid concept—e.g. concepts will sometimes include stored perceptual representations (Barsalou 1999; Prinz 2002), ideals (Barsalou 1985), and amodal symbols (Dove 2009). Each of these components will be more or less salient for various cognitive tasks.

According to the pluralistic hybrid view, concepts are context-sensitive constructions that link together various kinds of conceptual information. However, unlike traditional hybrid views, I do not claim that there is a unique hybrid structure that is always used by default in higher cognitive processing. Rather, in the spirit of pluralism, different hybrid concepts will involve

[15] It is beyond the scope of this paper to discuss why these bodies of information all count as concepts, or why we should follow Machery in claiming that the term 'concept' ought to be eliminated from psychological theorizing.
[16] This entails that the amount of information that can be included in concepts is constrained by the limitations of working memory. However, it does not require that working memory is the only place concepts are used.

different kinds of information and will link that information in different ways depending on the context. Although certain situations might call for only one kind of conceptual information, these are the exception rather than the rule. In addition, while certain pluralistic hybrid structures will likely be more common than others—and this will perhaps lead to some interesting generalizations about "kinds" of pluralistic hybrid concepts—these (few) regularities should not distract our attention away from more fundamental features of our conceptual processing; e.g. its ability to adapt the kinds of information and conceptual structure used to the context and task at hand.[17]

As a result, I contend that there is no default or unified hybrid structure that captures all concepts. Indeed, this is part of what makes concepts *pluralistic* hybrids. These pluralistic hybrids are individuated by their inclusion of different subsets of knowledge from long-term memory and their linking of that information in different ways. They are unified as concepts for the same category by their being co-referential and by the knowledge they include being linked within long-term memory.[18]

These pluralistic hybrids are used as inputs in the same cognitive processes, although there are likely multiple processes for many conceptual tasks; e.g. there are likely multiple cognitive processes for categorization, induction, combination, etc. (Figure 3). Therefore, while I retain Machery's multi-process theory (for at least many cognitive tasks), my view does not tie those processes to distinct kinds of concepts (or kinds of conceptual information). What distinguishes different cognitive processes from one another is the way they process information—i.e. which pieces (or kinds) of information are given the most weight and what kinds of inferences are used.

[17] In other words, we will no doubt be able to abstract away and discover some regularities involving the types of pluralistic hybrid concepts used in our higher cognitive processing. However, as is the case with concepts in general, these few regularities will likely be insufficient to show that there are kinds of concepts. Moreover, unlike Machery's Heterogeneity Hypothesis, on the pluralistic hybrid view these more common conceptual structures will involve more than one kind of conceptual information and will not have dedicated higher cognitive processes.

[18] However, it is beyond the scope of this paper to offer an account of reference for concepts. That issue will have to be addressed in a separate paper.

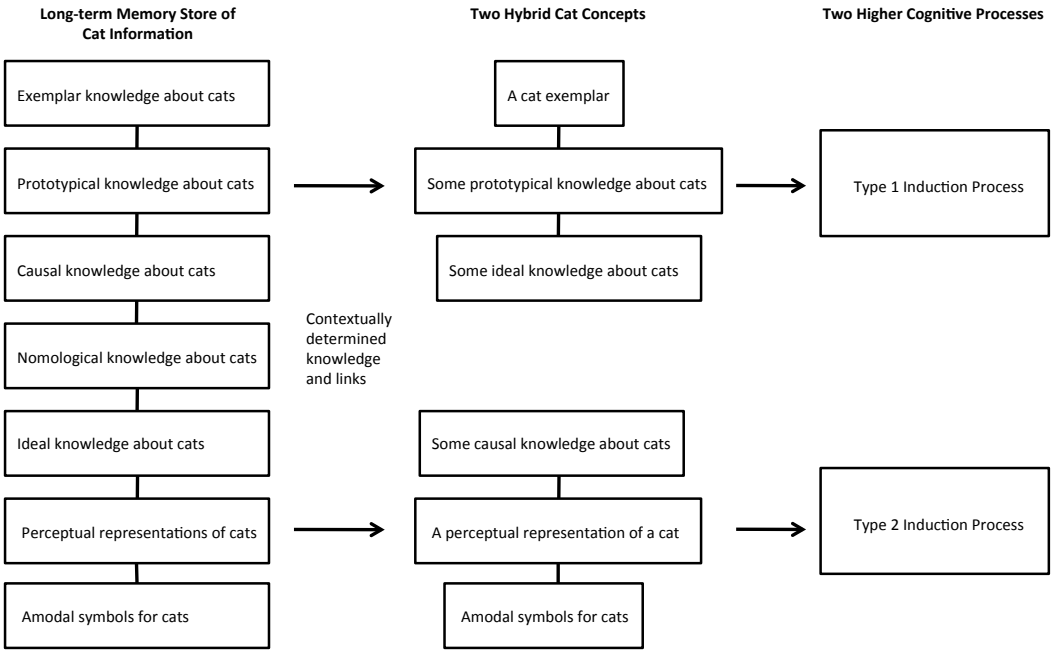

Figure 3: The pluralistic hybrid view of concepts.

As Figure 3 shows, the pluralistic hybrid view places the integration of different types of conceptual information *before* the processing of that information by our higher cognitive processes. This accords with the data reviewed above suggesting that our higher cognitive processes—e.g. categorization, combination, and induction—involve multiple kinds of conceptual information. In addition, the pluralistic hybrid approach accounts for the data showing that the conceptual knowledge we use is *highly adaptive* to the context since the conceptual information included (and the links between that information) will depend heavily on the context of cognition.

5. Additional Motivation for Pluralistic Hybrids: Cognitive Flexibility.

One of the main motivations for adopting the pluralistic hybrid approach over Machery's view is that it allows for greater cognitive flexibility. Our finite minds store a limited number of concepts, yet there appears to be no upper bound on the number of concepts we can entertain. Furthermore, our thought is systematic: the ability to entertain a complex concept is consistently accompanied by the ability to entertain its structural variants. In addition to being productive and systematic, our minds are able to integrate thoughts from almost any domain and we can draw inferences involving concepts from almost any category (Weiskopf 2009a). Finally, our minds can use a wide array of *kinds* of information to perform various cognitive tasks; e.g. we can use

exemplar and causal information simultaneously. One of the main obstacles for theories that postulate domain-specific cognitive process is the need to explain such cognitive flexibility (Carruthers 2006; Rice 2011).

Machery's account postulates input-specific cognitive processes that operate on prototypes, exemplars, and theories separately. Therefore, his view must explain how the (sometimes conflicting) outputs of these processes can be integrated so as to provide the cognitive flexibility we observe. The pluralistic hybrid view, in contrast, allows concepts and the processes that operate on them to link together and process multiple kinds of information simultaneously (presumably within some kind of common code). This allows for more direct integration of different kinds of conceptual information and allows various links within a concept to play integral roles within cognitive processing. These features, in turn, allow for more flexible, complex and integrated cognitive processing than if each kind of information were processed separately. Consequently, the need to account for our cognitive flexibility gives us additional theoretical motivation to favor the pluralistic hybrid view over Machery's Heterogeneity Hypothesis.

It is important to note that it is essential to this kind of explanation of our cognitive flexibility that various kinds of conceptual information are combined (or integrated) *before* our higher cognitive processes use that information. Otherwise, processes such as induction, categorization, combination etc. will not benefit from the use of multiple kinds of knowledge. For example, on Machery's view there are multiple induction processes that each operate on a single kind of conceptual information. Only *after* these fundamental kinds of concepts are processed is there a comparison (and perhaps integration) of their outputs. This, however, entails that most of our higher cognitive processes will not reap the benefits of integrating (or just involving) different kinds of conceptual knowledge. Indeed, the empirical data reviewed above suggests that each of these kinds of information are used *alongside one another* in several cognitive processes—e.g. our induction and combination processes appear to use multiple kinds of conceptual information simultaneously. Without the integration of these different kinds of information playing essential roles within our cognitive processing, it is unclear how we can account for the diverse array of cognitive flexibility we observe. At the very least, the pluralistic hybrid view provides a more straightforward explanation of how our minds are able to integrate multiple kinds of conceptual information and use that information simultaneously within higher

cognitive processing. In contrast, Machery's Heterogeneity Hypothesis does not allow for multiple kinds of conceptual information to be used within the same higher cognitive processes.

In sum, there is empirical and theoretical support for the pluralistic hybrid view. First, the available empirical evidence suggests that we have multiple concepts for each category whose use is determined by context and that multiple kinds of conceptual information are routinely involved (often simultaneously) in our higher cognitive processing. Second, the pluralistic hybrid view is able to overcome the objections raised to Machery's view because it does not require default bodies of knowledge to demarcate concepts from background knowledge and it does not require distinct cognitive processes for each kind of conceptual information. Finally, we have seen that the need to explain our extreme cognitive flexibility provides additional theoretical support for the pluralistic hybrid view. Taken together, these arguments provide strong support for the pluralistic hybrid view of concepts.

6. Some Possible Objections: Machery Against Hybrid Views.

Against hybrid views of concepts, Machery argues that in order for different types of knowledge to be part of the same hybrid concept two conditions must be satisfied. First, the parts of a hybrid concept must be *necessarily linked* together in the sense that when one of the parts is used in cognitive processing it is possible to use the other parts for other purposes (Machery 2009, 65). As a result, according to Machery, hybrid views require that all the linked parts of a hybrid concept are available when any one part is. Machery's second condition requires that the parts of a hybrid concept must be *coordinated* in the sense that they do not produce inconsistent results (Machery 2009, 65). He then provides empirical evidence showing that both of these implications of hybrid views are false. I respond by first arguing that the pluralistic hybrid view shows that hybrid views need not be committed to either of these claims. I then show how the empirical data cited by Machery is compatible with the pluralistic hybrid view.

To begin, the pluralistic hybrid view shows that the information within hybrid concepts need not be *necessarily* linked together across different contexts. Rather, in the spirit of pluralism, different concepts will involve different kinds of information and will link that information in different ways depending on the context. Which conceptual information is included in the hybrid concept will be determined by the context and the cognitive task at hand. There is no default or unified hybrid structure and the same information need not be necessarily

linked together across contexts. Indeed, this is an important part of why concepts are *pluralistic* hybrids.

Machery's second condition requires that the parts of a hybrid concept must be coordinated in the sense that they do not produce inconsistent results. I have two things to say in response. First, it is unclear why using the same hybrid concept in two different situations would not be expected to sometimes lead to conflicting results. Surely we do not expect individuals to only store consistent bodies of knowledge about a category within their long-term memory; e.g. individuals will have inconsistent beliefs about lots of things. Why, then, should we expect them to use this knowledge to construct hybrid concepts that will never result in conflicting judgments?

Second, the pluralistic hybrid view shows how a hybrid theory can allow for inconsistent judgments. This is because the pluralistic hybrid view allows different hybrid concepts (that involve different information) to be used in different contexts. That is, the pluralistic hybrid view predicts that using different hybrid concepts for the same category—i.e. hybrid concepts that involve different information and link that information in different ways—will sometimes give rise to inconsistent results.

In short, the requirements Machery places on hybrid theories of concepts are far too restrictive. Indeed, the pluralistic hybrid view illustrates how a hybrid theory of concepts can be formulated independently of these claims. Now that we have seen hybrid theories of concepts are more flexible than Machery's requirements, I turn to the empirical evidence he cites against hybrid theories.

The first set of evidence cited by Machery comes from Malt's (1994) data on the way people conceptualize water. The relevant result was that many liquids that are not called "water" were judged to have a higher proportion of H_2O than many other liquids that are called "water". On the other hand, we believe that water is (perhaps necessarily) H_2O and so when two liquids are both made of a high proportion of H_2O it is plausible that we will be more likely to judge the liquid with the higher proportion of H_2O as "water". One interpretation of these results, offered by Machery, is that subjects are using distinct concepts of water that include different kinds of information—one concept that involves prototypical features of water and another concept that involves the belief that water is necessarily H_2O. According to Machery, this data suggests that

we have two different concepts that give rise to inconsistent judgments, which he argues is not allowed by hybrid theories of concepts.

However, the pluralistic hybrid view can explain these results in at least two different ways. First, individuals might be selectively focusing (or weighing) different components of the same hybrid concept in these cases. Second, individuals may just be using *different* hybrid concepts for the same category in these situations. That is, they might simply be using *two different hybrid concepts* for water that involve different kinds of information and link that information in different ways. Therefore, the results are easily accounted for by the pluralistic hybrid view.

The second set of evidence offered by Machery concerns linguistic evidence on conflicting categorization judgments (Machery 2014; Machery and Seppälä 2010). He discusses examples such as:

"Tomatoes are vegetables."[19]

This statement might be considered true in one sense but false in another. Indeed, Machery and Seppälä (2010) provide empirical evidence that individuals are willing to assent to conflicting judgments if one sentence is true according to one kind of conceptual information and the conflicting sentence is true according to another kind of conceptual information; e.g. one sentence might invoke theoretical information about the category and the other prototypical information.[20] Machery argues that these conflicting judgments suggest that individuals are using two different concepts to evaluate the conflicting statements, which he argues is not allowed by hybrid views.

However, as before, it is possible that different components of a hybrid concept can be selectively accessed—or weighed differently—in different contexts. This would allow for the kinds of contradictory judgments involved in evaluating statements such as "Tomatoes are vegetables"—even if individuals use the same hybrid concept in both instances. So it is unclear

[19] Other examples used in this study include: "Whales are fish", "Penguins are birds", and "Zombies are alive" (Machery and Seppälä 2010). For each of these examples, a large portion of the individuals tested were willing to assent to conflicting judgments such as, "In a sense, whales are fish" and "In a sense, whales are not fish".
[20] Machery (2014) repeats this experiment with similar results and investigates other possible sources of the results—e.g. the role of the hedge "In a sense".

why these inconsistent judgments necessarily rule against hybrid theories of concepts (Malt 2010).

More importantly, even if we grant that these conflicting judgments show that two different concepts are being used (as before) *this answer is available to the pluralistic hybrid view as well.* This is because, contrary to Machery's requirements, hybrid theories of concepts need not be committed to the same hybrid concepts being used across different contexts. Rather, in light of evidence showing that the conceptual system is highly adaptive, we ought to suppose that in different contexts, individuals will use different hybrid concepts for the same category that will involve different conceptual information and link that information in different ways. Therefore, we should expect individuals to sometimes make conflicting judgments for the same category because they are using different hybrid concepts.

7. Future Research.

Machery has also objected to hybrid views on the following grounds: "More recently, some psychologists have developed new hybrid theories of concepts...I claim that most of them are terminological variants of the heterogeneity hypothesis, for psychologists are interested in the properties of the parts" (Machery 2005). It is certainly true that psychologists are interested in the properties of the parts in the sense that they are interested in the types of information stored in concepts and used by higher cognitive processes. However, the pluralistic hybrid view advocated here suggests a very different line of research for psychologists than Machery's Heterogeneity Hypothesis. Rather than focusing on distinct kinds of concepts and cognitive processes that are specific to a particular kind of information, the pluralistic hybrid view recommends that psychologists focus their attention on how various kinds of conceptual information can be linked together in context-sensitive ways and processed simultaneously to perform various cognitive tasks. Consequently, the pluralistic hybrid view suggests some interesting, yet largely unexplored, avenues for future psychological research. The advantages of simultaneously processing such context-sensitive hybrids have been outlined above, but little research has been done on how such hybrid systems might operate and how to optimize the use of different kinds of information within cognitive processing.

In addition, there are at least two kinds of empirical studies that would allow us to further adjudicate between the pluralistic hybrid view offered here and Machery's Heterogeneity

Hypothesis. First, if concepts divide into distinct kinds that are processed separately—as is required by Machery's account—then subjects ought to take more time to solve tasks in which more kinds of conceptual information are required. This is because on Machery's view, the outputs of different cognitive systems for the different kinds of concepts will have to be weighed against each other and this additional step will take time. For example, suppose that prototypical information and exemplar information were used in two distinct processes. Then, on Machery's view, these outputs must be weighed and integrated in order to yield a final judgment. Therefore, Machery's view involves a two-step process: (i) processing of different kinds of conceptual information by distinct cognitive processes and then (ii) the integration of the outputs of those distinct cognitive processes. Stage (ii) would presumably require more time to complete as additional kinds of conceptual information are introduced since more outputs will have to be taken into consideration—especially if those processes result in conflicting judgments.

In contrast, the pluralistic hybrid view predicts that additional kinds of information should have little to no effect on processing time since in most cases we will already use multiple kinds of information within a hybrid concept that can be processed within the same cognitive system(s). Although more information will require more time to process, this time difference ought to be comparable whether the additional information is of the same kind or not. In other words, according to the pluralistic hybrid view, the time to complete cognitive tasks ought to increase at approximately the same rate when additional information of the same type is incorporated as when information of different kinds is incorporated. So, if Machery's two-step processes view is correct, using different kinds of information ought to show a qualitative difference in processing times since multiple kinds of information will require an additional 'integration step'. In contrast, the pluralistic hybrid view predicts that incorporating different kinds of conceptual information will slow the process more gradually and the effect should be comparable to incorporating additional information of the same kind.

Second, if Machery's view is correct, there ought to be cases in which an individual can perform a cognitive task using one kind of conceptual information—e.g. categorization using prototypes—but cannot use another kind of conceptual knowledge to perform the same task. That is, there ought to be individuals who can use one kind of conceptual information for a task, but not other kinds of information. This would provide evidence that these two processes were dissociable in the way required by Machery's view. However, I know of no evidence suggesting

that this is the case.[21] Rather, what we typically find is that individuals have deficits across a kind of cognitive task regardless of the kind of information they are provided. This provides additional support for the pluralistic hybrid view, since it predicts that there ought to be individuals whose inability to perform a certain cognitive task ranges over multiple kinds of conceptual information.[22]

8. Conclusion.

In this paper, I have argued that concepts are pluralistic hybrids. According to the pluralistic hybrid view, there are several co-referential concepts for the same category whose use depends heavily on the context of cognition. Furthermore, concepts typically link together several different kinds of conceptual information. These pluralistic hybrids are then used in the same cognitive processes. In order to motivate the pluralistic hybrid view, I raised two objections to Machery's Heterogeneity Hypothesis. The pluralistic hybrid view overcomes these objections as well as the objections Machery raises to traditional hybrid views. In addition, the pluralistic hybrid view accounts for the available empirical data showing that, (1) our cognitive processing involves several concepts for the same category, (2) multiple kinds of conceptual information are often used by the same cognitive processes, and (3) the conceptual information used is highly adaptive to contextual factors. Finally, the pluralistic hybrid view has the advantage of allowing for greater cognitive flexibility by placing the integration of different types of conceptual information before their use by our higher cognitive processes. As a result of these empirical and theoretical motivations, it is worth pursing the largely unexplored avenues for future research suggest by the pluralistic hybrid view of concepts.

[21] Furthermore, as the above discussion makes clear, showing that individuals can use different kinds of conceptual information for the same cognitive task is consistent with both views.

[22] However, given that there are likely multiple processes for the same cognitive task, it will be difficult (but not impossible) to design experiments that will be able to investigate such deficits.

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