Abstract

Specifying the information possessed by a subject is not enough to explain her behavior. One must also specify the conditions under which information is accessible to her. Attention to access conditions allows us to model cases of imperfect recall and of confused or fragmented mental states. It also allows us to shed light on the difference between propositional knowledge and knowledge-how.

Contents

1 Introduction 2
2 Limitations on information access: motivating idea 2
3 Imperfect recall: Jack’s memory 3
4 Aha!-moments: a word puzzle and a metapuzzle 4
5 Access tables and indexed mental states 5
6 Access tables can help explain behavior 7
7 Is indexing necessary? 9
8 Access tables and belief 11

*Thanks to Andrew Bacon, Ross Cameron, David Chalmers, Jonathan Cohen, Keith DeRose, Cian Dorr, Hartry Field, Branden Fitelson, Jeremy Goodman, David Hunter, Frank Jackson, Shivaram Lingamneni, Michael Rescorla, Robert Stalnaker, Jason Stanley, Bruno Whittle, audiences at the 2008 Arizona Ontology Conference, Brown University, the Catholic University of Peru, CUNY, the National Autonomous University of Mexico, the University of Bologna, UC Berkeley, UC Riverside, UC Santa Cruz, University of Leeds, University of Paris (IHPST), University of Oslo, University of Texas at Austin, and Yale University, the Corridor reading group (on two occasions), and participants in a graduate seminar session at Rutgers University and a Fall 2011 joint MIT/Princeton graduate seminar. The initial direction of this paper was enormously influenced by conversations with Andy Egan.

†ae@adamelga.net, arayo@mit.edu
A soldier walks an intricate path to successfully evade the mines littering a mine-field.\footnote{Cf. Braddon-Mitchell and Jackson (2007).} A student scratches out just the squiggles on a piece of paper that earn her top marks. A bank manager turns the dials of a safe in the precise way required to open it. What helps explain each success is that the subject has access to appropriate information.

The aim of this paper is to draw attention to cases involving limited information access. Our main claim is that in order for ascriptions of information to explain the behaviors manifested in such cases, they must be “indexed”: they must determine what information is available to the agent relative to various circumstances.\footnote{The suggestion in Stalnaker (1984) that logical omniscience failures can be understood in terms of fragmented belief states was the core motivation for the present model. Braddon-Mitchell and Jackson (2007, 199–200) also uses fragmented coarse-grained belief states to accommodate failures of logical omniscience. Yalcin (2008, Ch. 3), Yalcin (2015), and Yalcin (2016) develop that same suggestion, proposing an elegant model on which all-or-nothing belief is relative to questions, understood as partitions of logical space. The treatment of logical omniscience failures in those works uses privileged partitions to represent which propositions are accessible to an agent, and so differs from the present treatment. (See especially Yalcin (2016, n. 26).) Egan (2008) endorses a treatment of fragmented credences similar to the present one and interestingly suggests that mental fragmentation might be practically indispensable for agents with perceptual belief forming mechanisms anything like human ones—mechanisms that are less than perfectly reliable but which nevertheless produce immediate belief in certain circumstances. Other work congenial to indexing includes Brown and Priest (2004), Greco (2015, forthcoming), Lewis (1982), Parikh (2008), Schwitzgebel (2001), and, of course, many of the articles in the present volume.}

Sometimes different bits of information are available to an agent for different purposes. To see why, cast your mind back to the early 1980s, well before telephone numbers were searchable online.

In those days—the early days of computer hacking—“reverse phone books” were prized by hackers. A reverse phone book is just a phone book...
whose entries are sorted by telephone number instead of by name. Such books were valuable because they enabled one to easily figure out the name associated with any given phone number. A hacker would sometimes need to swindle information from the person at a given phone number. He would use the reverse phone book to get the name of that person, and then call the number and use his knowledge of the name to gain the person’s confidence.

Compare a phone book for a neighborhood with its corresponding reverse phone book. The hacker doesn’t care about the phone book at all, but desperately wants the reverse phone book. Why? Not because the reverse phone book contains different information than the ordinary one. After all, the books contain exactly the same listings, just in a different order. Rather, the hacker prizes the reverse phone book because of the way it allows him to access that information.3

A hacker equipped with a reverse phone book is able to quickly answer questions of the form: “Who has phone number 545-3899?”. In contrast, answering such a question using just an ordinary phone book would require painstakingly examining every listing on hundreds of pages.

Let us use “accessible” to mean “immediately available”. Then we can summarize the discussion so far as follows: information can be represented in a way that makes it accessible for some purposes, but inaccessible for others (Stalnaker 1991).

3 Imperfect recall: Jack’s memory

The above point applies to human memories as much as it does to phone books. Often our memories provide fast access to some information for one purpose but not another. For example:

Jack’s memory  Jack has a neighbor he sees only infrequently. The neighbor’s name is “Beatrice Ogden”, and she lives in apartment 23-H. If asked “What is the name of the person in 23-H?” Jack is disposed to groan, scratch his head, mutter “I know this, don’t tell me...” but be unable to answer. But if instead asked “How do you know Beatrice

3 Talk of “information” is in one respect misleading. Saying that a subject has some information at least suggests that the information is true. But the truth value of the “information” will play no role in our discussions. So we will use “information” non-factively, so that false information counts as information, too.

4 Indeed, as the designers of computer databases are well aware, this is not the exception but the rule. Often setting up a database to make its information easily accessible for one purpose will make that information less accessible for other purposes.
Ogden?”, Jack is disposed to immediately reply, “She’s the person in 23-H.”

Jack possesses the information that Beatrice Ogden is the person in 23-H, but is able to access it for some purposes and not for others. He enjoys the sort of access that would be helpful when attempting to direct a letter addressed “To: Beatrice Ogden”, but not the sort of access that would be helpful when going over to 23-H and calling a greeting through the door. We will return to this case in §7.

4 Aha!-moments: a word puzzle and a metapuzzle

The difference between a batch of information being present in a system and its being accessible for a certain purpose can be used to represent certain kinds of Aha!-moments in reasoning. As an example, consider the following word puzzle:

Is there a word of English ending in the letters “MT”?5

Think about this puzzle for a moment before turning the page.

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5 This puzzle, and the use of it in the present context, is adapted from a very similar puzzle in Powers (1978, 340–341). See also Crimmins (1992).
DREAMT.

Now for the metapuzzle. Even before hearing the puzzle you knew perfectly well that “dreamt” is a word of English and knew how to spell it. Indeed, you knew that “dreamt” is a word of English ending in “MT”.

(If before hearing the puzzle someone had excitedly announced to you, “Dreamt’ is an English word ending in ‘MT’!” you might have thought to yourself, “I knew that already.”)\(^6\)

This means that information you already possessed—that “dreamt” is a word of English ending in “MT”—is sufficient to solve the puzzle. The metapuzzle is: given that you had in advance information that suffices to solve the puzzle, why wasn’t the puzzle trivial to solve?

We suggest that when you solve the puzzle, information you possessed all along—the information that “dreamt” is a word of English ending in “MT”—becomes accessible for a new purpose. It becomes accessible for the purpose of answering the question “Is there a word of English ending in ‘MT’?”\(^7,8\)

Lesson: sometimes an Aha!-moment—such as the mental change that occurs when one first solves the “dreamt” puzzle—crucially involves a change in what information is accessible to a subject for a particular purpose.

5 Access tables and indexed mental states

We have claimed that to accommodate cases involving limited recall, we must rely on “indexing”. In other words, we must specify what information is available to an agent relative to various purposes. It is time to give a concrete example of how such indexing might work.

Start with some terminology. Say that an “elicitation condition” for an agent is a choice situation for that agent. For example in the case of Jack, one elicitation condition is being asked “who is in apartment 23-H?”. Another one is being asked “who is Beatrice Ogden?”. Elicitation conditions often prompt an agent to deploy information for a particular purpose, so it is sometimes convenient to think of elicitation conditions as purposes.

Now for the example. Let Phonebook Creature be a non-human thinker who mentally represents information about phone numbers using an ana-

\(^6\)This case and its use in the above argument is drawn directly from (Powers 1978, 341).

\(^7\)Philosophy of mind mavens may find this reminiscent of the “ability” reply to the Mary argument. That connection is pursued in Rayo (2013, ch. 4). See also Cath (2009).

\(^8\)Some will say that in addition to existing information becoming accessible to you for new purposes, something else happened as well: you acquired new information. We doubt this (Elga and Rayo 2009, 2019, Stalnaker 1984, 1991), but won’t argue the point here.
logue of an ordinary phone book. He is able to quickly answer any question of the form “What is so-and-so’s phone number?” by looking up the number by name. But it would take him a long time to answer questions of the form “Who has such-and-such a phone number?” for the same reason that it would take an ordinary person a long time to answer that question using an ordinary phone book.

Below is an “access table” for the Phonebook Creature—a table specifying what information is available relative to each elicitation condition. Like all of the access tables in this paper, this one is abridged and simplified for brevity:

<table>
<thead>
<tr>
<th>Elicitation Condition</th>
<th>Information accessible relative to that condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked “What is Selma K. Petersen’s phone number?”</td>
<td>Selma K. Peterson’s phone number is 545-3899.</td>
</tr>
<tr>
<td>Asked “Who has phone number 545-3899?”</td>
<td>[No relevant information]</td>
</tr>
<tr>
<td>[more conditions]</td>
<td>[information accessible relative to those conditions]</td>
</tr>
</tbody>
</table>

Each row of an access table consists of an elicitation condition, together with a state of mind associated with that condition. The state of mind associated with a condition reflects the information available to the subject relative to that condition.9

For example, the first row of the above table indicates that the phonebook creature is able to access the information that Selma K. Peterson’s phone number is 545-3899 in response to the question “What is Selma K. Petersen’s phone number?”. The second row indicates that creature is not able to access that information in response to the question “Who has phone number 545-3899?”. Other rows, omitted for reasons of space, are associated with yet other questions.

Note that Phone Book Creature’s access table contains many rows, even though he has a very simple method for representing his information: a

9We have not specified exactly how states of mind are to be represented in the entries in the right-hand column of access tables. That is because we are trying to be neutral between two approaches. On one approach, states of mind are represented in a way that employs fine-grained propositions. On another approach—the one we favor—states of mind are represented by sets of probability functions defined over the space of possible worlds. We think (Elga and Rayo 2009, 2019) that using access tables in the second way leads to an attractive solution to the problem of logical omniscience (Hintikka 1975), a solution which is very much in the spirit of Stalnaker (1984, 1991, 1999).
single alphabetized listing and a method for searching that listing by name. So rows of an access table need not correspond to anything like modules or subsystems in a brain. Therefore there is no reason to think that a brain must be particularly large or intricate in order to embody an access table with many rows. More generally, when we describe a subject’s mental state using an access table, we specify what information is accessible to her relative to what elicitation conditions. But we do not specify the cognitive architecture underlying that pattern of access.\textsuperscript{10} As point of comparison, a corresponding point holds for representations of mental states using probability functions: attributing a particular credence function to an agent does not specify the cognitive architecture underlying the agent’s credences.

A further clarification: access tables are meant to distinguish between cases in which someone is able to immediately deploy some information, and cases in which she is isn’t. But to quickly deploy some information, one needn’t have explicitly represented the information in advance. So when an access table indicates that the subject has access to some information relative to an elicitation condition, this does not require that the subject has the information explicitly represented in advance.

Parikh (2008, 467) suggests a helpful analogy: some book buyers care only that their books ship quickly when ordered, and not at all whether they are shipped from a pre-stocked warehouse as opposed to being printed quickly on demand.\textsuperscript{11} Likewise, when a theorist is interested in understanding an agent’s behavior in informational terms, she might care only whether the agent is able to quickly deploy a piece of information when required, and not at all whether the information was explicitly represented in advance.

6 Access tables can help explain behavior

Access tables tell us about information possessed, and facts about information possession can often help explain behavior.

Recall a case from the very beginning of the paper: A soldier walks an intricate path to successfully evade the mines littering a mine-field. His success is partly explained by his possession of accurate information about the location of the mines. Since the soldier’s access table tells us about the information he possesses, it can be cited as part of such an explanation.

Such an explanation is non-trivial. For example, it rules out that the soldier succeeded through luck alone. Of course, the explanation is also

\textsuperscript{10}For a critique of certain indexed theories which make strong claims about cognitive architecture, see Norby (2014, 34).

\textsuperscript{11}Field (1978, 36–37) makes a similar point
incomplete and, in some contexts, a fuller explanation might be desirable. For example, if the soldier is suspected of being a spy it might be helpful to determine how he acquired the information about the mines. (“Captain, he got through the minefield because he stole the map from your safe!”)

Note that in most ordinary contexts, it wouldn’t be helpful to give a fuller cognitive explanation—an explanation that details the precise cognitive mechanisms that underlie the soldier’s mine-evading actions. (“Captain, he got through the minefield because he had syntactic representation J8767 in mental module KR7!”) We certainly do not question the importance of cognitive explanations. They are, after all, essential to the project of understanding how the mind works. We just think that cognitive explanations are not the only ones worth investigating.

Access tables have an advantage over straight ascriptions of information: they tell us about the subject’s ability to access information under different circumstances, rather than simply telling us what information is in the subject’s possession. For example, consider an agent struggling to solve the “dreamt” puzzle from §4. An access table for this agent might allow us to explain her inability to complete the puzzle by entailing that for the purpose of solving the puzzle she couldn’t access the information that “dreamt” is a word of English ending in MT, and explain her annoyance a few moments later (when she hears her friend suggest “dreamt” as an answer) in terms of her realizing that all along she had enough information to solve the puzzle, but failed to access it.

Access tables also have a potential disadvantage over straight ascriptions of information. When their elicitation conditions are exceedingly narrow, “explanations” in terms of access tables can become nearly trivial. For example, consider an access table indexed by elicitation conditions like “Being asked one’s name on a Tuesday by someone with a red striped shirt and a voice of frequency 129.2389 Hz...” Such an access table comes close to amounting to a giant laundry-list of maximally specific dispositions. An access table is only explanatory when its elicitation conditions are sufficiently broad.

Moral: The explanations that access tables are well-suited to deliver—information-based explanations—do not settle what detailed mental architecture a subject employs. But such explanations are often the ones we care about most, as illustrated by the case of the soldier in the minefield.
7 Is indexing necessary?

We have seen that indexing ascriptions of information to elicitation conditions allows us to explain a subject’s behavior even when she has imperfect access to her information. But one might wonder: “Is indexing really necessary? After all, indexing is complicated and unfamiliar. Why not just use off-the-shelf tools from the philosophy of mind to represent the above phenomena? Why must we introduce any kind of relativity to elicitation conditions at all?

The answer is that (so far as we can see) the phenomena can only be accommodated by introducing relativity to elicitation conditions. The remainder of this section explains why.

Suppose that we wish to describe a subject’s mental state in a way that tells us what questions the subject is able to answer. For simplicity, let us focus on fill-in-the-blank questions such as:

(a) Paris is the capital of ______.

(b) ______ is the capital of Italy.

Without using a special apparatus such as indexing, how might we describe a subject’s mental state in a way that settles which fill-in-the-blank questions she can answer?

A simple approach is to describe the subject’s mental state by saying what she believes, using the ordinary notion of belief. For example, when a subject believes that Paris is the capital of France, she can answer question (a). When she believes that Rome is the capital of Italy, she can answer question (β). More generally, the idea is that when a subject believes a claim, she can answer fill-in-the-blank questions corresponding to that claim (where the correspondence is as illustrated above).

That simple approach won’t work in general. To see why, go back to the case of Jack (§3), who can produce his neighbor’s apartment number when supplied with her name, but not the other way around. Now consider the following fill-in-the-blank questions:

(1) The person in apartment ______ is named “Beatrice Ogden”.

(2) The person in apartment 23-H is named “______”.

Because of his imperfect recall, Jack would be able to complete an exam containing only question (1) but not an exam containing only question (2). But the simple approach can’t straightforwardly deliver both these results.\(^\text{12}\)

\(^{12}\)Compare to Schwitzgebel (2001, 79).
The simple approach faces a dilemma: Does Jack believe that the person in apartment 23-H is named “Beatrice Ogden”, or not? If so, then the proposal entails that he is able to answer both questions (1) and (2). If not, then it entails that he is able to answer neither. Either way, the simple approach delivers the wrong results.

Can the simple approach be fixed?

One possible fix is to say that with respect to the elicitation condition of being asked question (1), Jack believes that the person in apartment 23-H is named “Beatrice Ogden”, but with respect to being asked question (2), he does not. This fix amounts to a form of indexing.\(^{13}\)

Another possible fix is to take beliefs to be highly unstable. For example, one could claim that when Jack is yet to be asked any questions, he does not believe that the person in apartment 23-H is named “Beatrice Ogden”. But he would quickly acquire that belief under certain circumstances (such as being asked question (1)).\(^{14}\)

To an advocate of this instability fix we pose a question: what is it about Jack’s pre-question mental state that explains why, upon being asked question (1), he so quickly and effortlessly comes to realize the answer? The advocate might answer: “There is nothing about Jack’s pre-question mental state that explains this”. In that case we reply that the resulting notion of mental state is impoverished, since it delivers the unwelcome result that a subject’s memories need not be reflected in her mental state.

Alternatively, the advocate of the instability fix might take memories to be part of the subject’s mental state, but propose that an agent’s stock of memories is distinct from her beliefs: a memory only becomes a belief when

\(^{13}\)There are other ways of implementing the same general idea. For instance, one might employ “qua” terminology, or one repurpose modes of presentation or guises. Alternatively, one might claim that being able to correctly answer question (2) requires

believing that the answer to the fill-in-the-blank question “The person in apartment _______ is named ‘Beatrice Ogden’” is “23-H”.

but being answer to correctly question (1) requires

believing that the answer to the fill-in-the-blank question “The person in apartment 23-H is named ‘______’” is “Beatrice Ogden”.

These approaches all add an extra component to each belief attribution: a component that picks out an elicitation condition. So they introduce a form of indexing. (We are grateful to Keith DeRose for bringing up related ideas in discussion. As Jason Stanley pointed out to us, invariantist versions of the proposals are also available.)

\(^{14}\)Compare to Audi (1994) and to the “shifting view” endorsed in Rowbottom (2007) and criticized in Schwitzgebel (2010, 543). A version of this proposal was independently brought to our attention by Bacon (2017).
it is recalled. For example, Jack starts out with the memory that the person in apartment 23-H is named “Beatrice Ogden”, but not the corresponding belief. That memory only becomes a belief when Jack hears question (1). This proposal is form of indexing. Notice, in particular, that Jack’s mental state can only settle what questions he is able to answer by settling what memories he is able to recall relative to what conditions. So indexing figures in the overall theory of Jack’s mental state as it affects his dispositions to act.

Moral: There are different ways in which indexing might be brought in to explain the behavior of an agent with imperfect access to her information. But it is hard to see how indexing can be avoided altogether. Here we do not take a stand on the question of whether off-the-shelf tools from the philosophy of mind, such as belief and recall, should be indexed. Instead, we use access tables as a minimal representation of the mental state of a subject with imperfect access to her information.

8 Access tables and belief

We have not provided an analysis of belief, or a semantics for belief attributions. Instead, we have advocated access tables as a way of explaining the behavior of agents with limited access to their information. The notion of an access table does not exactly match up with the ordinary folk notion of belief, and it would take work to connect the two notions. Fortunately, an account of belief is neither necessary nor sufficient for shedding light on cases involving limited access to one’s information.

9 Mental fragmentation

We now turn to some additional applications of our proposal.

People are sometimes in confused, incoherent, fragmented or divided states of mind. For example:

Mental Maps (cf. Lewis 1982) Whenever Andy travels to Leicester Square on foot, he treats Charing Cross Road as though it runs east-west. But whenever he travels to Leicester Square by train, he treats Charing Cross Road as though it runs north-south. And this is so even though he is confident that there is only one Queen Street near Leicester Square. According to Andy, how is Charing Cross Road oriented?16

15Norby (2014, 34–35) raises some challenges for those who wish to use an indexed-based framework to analyze belief.
16Evidence of fragmented mental representations in tasks relating to spatial layouts
Split brain (Nagel 1971) A split-brain patient is simultaneously shown a picture of a chicken in his left visual field, and a picture of a shovel in his right visual field. Upon being asked what he sees, he is disposed to answer: “A shovel”. But upon being given a toy chicken and a toy shovel and asked to hand over an object similar to what he sees, he is disposed to hand over the chicken. According to the patient, what picture was he shown?

Disavowed Racism (Schwitzgebel 2010, 532) Juliet “has critically examined the literature on racial differences in intelligence, and she finds the case for racial equality compelling. She is prepared to argue coherently, sincerely, and vehemently for equality of intelligence and has argued the point repeatedly in the past... And yet Juliet is systematically racist in most of her spontaneous reactions, her unguarded behavior, and her judgments about particular cases. When Juliet is on the hiring committee for a new office manager, it won’t seem to her that the black applicants are the most intellectually capable, even if they are.” According to Juliet, how do the average intelligence levels of blacks and whites compare?17

Witness When asked to pick the perpetrator out of various lineups, a witness is disposed to confidently pick men with a particular sort of thin, bearded face. But when asked to produce a sketch of the perpetrator with the help of a police sketch artist, that same witness is disposed to confidently produce a sketch of a fat, beardless face. According to the witness, what did the perpetrator look like?

Each of these people is in a divided state of mind—none of them has a completely coherent conception of how the world is. How should we represent the mental states of such people? We would like to have the mental state we ascribe to an agent lead to appropriate predictions about how the agent is disposed to act. But the simplest such proposals fail to do so.18

For example, consider the case of the witness. Suppose that the witness is sitting at home, not thinking about the crime at all. How should we represent her mental state in order to capture the full range of her dispositions to


17Schwitzgebel (2010) calls the attitude exhibited in this and similar cases “in-between belief” and convincingly refutes attempts to analyze it in terms of existing categories such as pure belief or disbelief.

18The remainder of this subsection draws heavily on Schwitzgebel (2010).
action (both her pick-out-of-a-lineup dispositions and her create-a-sketch dispositions)?

If one simply said “The witness believes that the perpetrator had a beard”, that would lead to the incorrect prediction that the witness is disposed to produce sketches of bearded men. If one simply said “The witness disbelieves that the perpetrator had a beard”, that would lead to the incorrect prediction that the witness is disposed to pick beardless men out of lineups (Schwitzgebel 2010, 543).

How about saying “The witness is highly uncertain whether the perpetrator has a beard,” or “The witness suspends judgment on the matter”? This would also lead to incorrect predictions. It would predict that the witness is disposed to vacillate, exhibit doubts, or refuse to deliver a strong judgment when queried about the appearance of the perpetrator. But in fact she is disposed to confidently pick bearded men from lineups and to confidently produce sketches of beardless men.

Now suppose one simply said “The witness is confused about whether the perpetrator has a beard,” or “The witness both believes that the perpetrator is bearded and believes that the perpetrator is beardless.” The resulting proposal would be at best incomplete. To see why, consider a second witness. The second witness is just like the first one, except that he is disposed to pick beardless men out of lineups, but to produce sketches of bearded ones. In other words, the second witness has a pattern of dispositions that is “swapped” with respect to the first.

The two witnesses have different dispositions concerning the beardedness of the perpetrator. But the description “confused about whether the perpetrator has a beard” applies to the two witnesses equally well. And the same goes for the description “believes that the perpetrator is bearded and believes that the perpetrator is beardless”. So neither description captures the difference in dispositions between the two witnesses.

Notice, in contrast, that the witness’s behavior can be explained using the following access table:

<table>
<thead>
<tr>
<th>Elicitation Condition</th>
<th>Information accessible relative to that condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual recognition of perpetrator</td>
<td>Perpetrator had a thin, bearded face</td>
</tr>
<tr>
<td>Production of sketches of perpetrator</td>
<td>Perpetrator had a fat, un-bearded face</td>
</tr>
</tbody>
</table>

This access table gets across that the witness is confused (i.e., is incoherent, fragmented, of two minds) about whether the perpetrator had a beard.
More importantly, it pins down the specific type of confusion. It specifies circumstances in which the witness is disposed to act as if the perpetrator was bearded, and circumstances in which she is disposed to act as if the perpetrator was beardless. That specification of circumstances matters, because it increases the extent to which the table is able to explain the witness’s behavior.¹⁹

10 Indexing and abilities

We have seen how to use indexing to represent the mental states of agents who have imperfect memory access and agents who confused or incoherent. Indexing can also represent the mental states of agents whose propositional knowledge differs from their know-how. Let us explain.

Sometimes, in order to make use of some information, a subject must perform the right sort of action. For example:

**Slot** A patient suffering from visual agnosia is presented with a surface with a slot cut into it. The slot is oriented diagonally. When given a card and asked to orient the card at the same angle as the slot, or to verbally report the orientation of the slot, the patient is unable to comply. But when asked to *place* the card in the slot, she immediately orients the card correctly as he extends her hand to the slot.²⁰

¹⁹Gendler (2008a,b) has brought attention to some fascinating cases involving divided states of mind. These cases, it is argued, highlight the difference between belief and a state of mind dubbed “Alief”. For example, Gendler (2008b, 636) describes a traveller who leaves home without her wallet and asks a friend for a loan. When the traveller receives the money and needs a place to store it, she unreflectively reaches for her wallet. Such cases exhibit a distinctive asymmetry. One behavior—asking a friend for money—has features which are paradigmatically rational (they are responsive to evidence, for example). But another behavior—searching for one’s wallet in an effort to store the money—does not.

Access tables can be used to represent some aspects of cases of this kind. In particular, there is a simple access table that captures the wallet-related dispositions to behavior in the example above. On the other hand, some cases of Alief involve dispositions that are not particularly robust, and some of them involve behaviors that are not naturally rationalizable. Access tables may not be well-suited to representing such cases.

In using an access table to represent a divided state of mind, one doesn’t settle whether that case exhibits the distinctive asymmetry mentioned above. Nor does one take sides on whether the cases discussed in Gendler (2008a,b) form a psychological natural kind.

²⁰Here is a description of one such patient, known in the psychology literature as “D.F.” (Milner et al. 1991, 418–421; Milner 1997, 1250):

Even though [D.F.] was very poor at describing or demonstrating the orientation of a line or slot, she could still reach out and post a card into the same slot without error. Similarly, despite being unable to report (verbally or manually)
In this case, the orientation of the slot is available to the patient for performing one sort of action (putting the card in the slot) but not another sort (just orienting the card).

As before, we can represent the patient’s limited access to her information with an appropriate table. In this case, the elicitation conditions differ not in what question the subject is asked, but rather in the way the subject indicates her answer:

<table>
<thead>
<tr>
<th>Elicitation Condition</th>
<th>Information accessible relative to that condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate orientation of slot by orienting card</td>
<td>[Uncertain about orientation of slot]</td>
</tr>
<tr>
<td>Indicate orientation of slot by inserting card</td>
<td>Slot is diagonal</td>
</tr>
</tbody>
</table>

The above example involves a visual deficit, but similar cases are completely mundane. For example, can you immediately say whether the following claim is true?—

Your standard shoe-tying method involves looping the cord around your right thumb.

Some of us have trouble immediately answering this question. Even so, the requisite information is in us somewhere—otherwise we wouldn’t be able to tie our shoes. What causes the trouble is that the information is encoded as part of a motor memory sequence, and an actual or imagined shoe-tying operation is necessary to extract it.

In the shoe-tying example, the subject has access to some information for the purpose of performing one sort of action but not another. It can also happen that a subject has access to some information for the purpose of performing one sort of action, and access to contrary information for the purpose of performing another sort.

For example, consider the following surprising fact about cycling: in order to initiate a slow right turn one typically leans to the left. All competent cyclists are in a position to deploy that information for the purposes of

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the width of a rectangular block, she would still tailor her finger-thumb grip size perfectly in advance of picking it up. In short, she could guide her movements using visual cues of which she seemed completely unaware. (Goodale and Milner 2006, 660)

We learned of the existence of such patients from Kelly (2000, 171).

21See http://socrates.berkeley.edu/~fajans/Teaching/Steering.htm. This fact was brought to our attention by Richard Holton.
making turns. But few are able to deploy it for the purposes of explaining
to ride a bike. In fact, when giving verbal explanations, most cyclists are
disposed to report exactly the opposite. In this case, too, we can represent
the cyclist’s differential access to information with an appropriate access
table.

11 Knowledge-how versus knowledge-that

Natural language sometimes distinguishes between knowledge-how and
knowledge-that. Ordinary ascriptions of knowledge-how tend to track the
subject’s ability to perform practical tasks competently. In contrast, ascrip-
tions of knowledge-that tend to track the subject’s ability to articulate infor-
mation linguistically, or use it in reasoning. Knowing how to ride a bicycle,
for example, ordinarily goes with having the ability to competently ride a
bicycle. Knowing that the Battle of Hastings occurred in 1066, on the other
hand, ordinarily goes with the ability to state when the Battle of Hastings
took place, or use that information in the course of figuring out whether the
Battle of Hastings preceded the Battle of Waterloo.

Appealing to indexed mental states does not on its own deliver a char-
acterization of the knowledge-that/knowledge-how distinction. But it im-
proves our understanding of that distinction by locating it in a broader
context. For notice how natural it is to describe the above examples in terms
of knowledge-how and knowledge-that:

- The ordinary shoe-tying practitioner knows how to tie his shoes. But
  he doesn’t know that his shoe-tying method involves looping around
  his right thumb.

- The bicycle rider knows how to perform a slow right turn. But he
doesn’t know that to perform a slow right turn one must start by
leaning left.

In each case, saying that the subject has knowledge-how conveys that the
subject has access to relevant information for the purpose of performing one
sort of action (tying shoelaces, putting the card in the slot, riding a bicycle).
In contrast, saying that the subject lacks knowledge-that conveys that the
subject lacks access to that information for the purpose of performing another
sort of action (explaining shoelace-tying, explaining bicycle riding).

This suggests that in general, the difference between having knowledge-
that and having knowledge-how amounts to the difference between having

information available for one sort of action, and having it available for another. Indexing is well suited to representing this sort of difference.\textsuperscript{23,24}

**References**


\textsuperscript{23}There is a much-disputed question: can knowledge-how be analyzed in terms of knowledge-that? (Glick 2011, Hawthorne and Stanley 2008, Ryle 1949, Stanley 2011, Stanley and Williamson 2001). Even those who think that knowledge-how can be analyzed in terms of knowledge-that agree that typical ascriptions of knowledge-how make systematically different claims than typical ascriptions of knowledge-that. So it is open to them to represent that difference in terms of information being available for different purposes. For example, according to Stanley and Williamson (2001) knowing how to ride a bicycle amounts to knowing, of a particular way \( w \) thought of under a “practical” mode of presentation, that \( w \) is a way to ride a bicycle. It is compatible with this analysis to say that having that information under a practical mode of presentation amounts to having it available for the purpose of performing certain actions.

\textsuperscript{24}For more on using indexing to represent know-how, see Elga (2012), Rayo (2013, §4.5), and Bianchi (2014).

Adam Elga and Agustín Rayo. Fragmented belief states and logical omniscience. 2009. CUNY Graduate Center presentation.


Seth Yalcin. Figure and ground in logical space. Posted at http://escholarship.org/uc/item/11c0x4n5, on 12–02–2015, 2015.