Non-Analytic Conceptual Knowledge

M. GIAQUINTO

The main aim of this paper is to argue that a priori conceptual knowledge is possible even if unrevisable analytic knowledge is not. The considerations put forward by Quine (1951, 1960) against the possibility of unrevisable knowledge resting on analysis of linguistic meanings and deduction from definitions do not weigh against the possibility of a priori discovery by the kind of conceptual thinking I will outline and illustrate in this paper. A secondary aim is to show that Quine's doubts about analyticity still have considerable force and must therefore be reckoned with by any proponent of conceptual knowledge.

1. Quine untouched

The thesis of the paper is that the influential Quinean considerations against analytic knowledge are consistent with conceptual knowledge of a certain kind. It is not argued that Quine is right about analyticity, but it is argued that the full version of Quine's view has not yet been shown to need restricting. Restricted Quineanism has had some big backers. Putnam has claimed that Quine was almost right, was more right than wrong, was importantly right and only trivially wrong, but wrong nonetheless, as statements such as "all bachelors are unmarried" are indeed analytic (Putnam 1962; also 1976, 1979). Others have claimed analyticity for "all vixen are female foxes" and for definitions of kinship terms. Once we allow a few exceptions we might find it difficult to keep out mathematics and logic. We might then be able to sneak in some metaphysics too if we call it modal logic; and then we would have much of what philosophers have wanted to count as analytic anyway. Perhaps Quine would be trivially right and importantly wrong if some whittled down version of his views were correct and not the full version. It will be no part of the strategy of this paper to sneak in something by assuming that the full version has only restricted application. On the contrary, I think that the unrestricted Quinean view has considerable merit, and that Quine's original thinking withstands later attempts to show him wrong. I will now try to substantiate this. We will then be in a better position to see whether the kind of conceptual discovery to be outlined really escapes Quine's sceptical net.

The Quinean view is that any sentence we take to be true might come to be rationally rejected as false in the light of experience, and there would be nothing which would make such an event a mere change of language and not a change of theory. The basis of this is a view about evidence, namely, that experience confronts the aggregate of our theories as a whole. To be a little more specific, the idea is that experience confirms or undermines a hypothesis or theory only when other hypotheses are held fixed, i.e. assumed true. Experience alone does not dictate which hypotheses are to be held true; this is a pragmatic matter. Support for a claim, however well established, however much it seems like a definition, may vanish if we jettison things we formerly held true; and this we may do for the purpose of explaining data with maximal overall simplicity.

One example is the dictum that the shortest path between two points is a straight line. Observations led to acceptance of a theory according to which, for some pairs of points, more than one connecting path is minimal and these paths bend round massive objects. Something which seemed to be a definition of "straight line" was given up when General Relativity was accepted. It may be thought that this is just a change of language, that the term "shortest path" is no longer being used with its original sense but now means "quickest photon route" or something similar. Certainly there was a change in the use of language, and on some views that constitutes a change of meaning. But there was also a change of theory, a change of belief. Beforehand physicists thought that there was exactly one path of minimal distance between any two fixed points, a path that does not bend. Now they disbelieve this. Something that was taken to be true by definition turned out to be false.

This is just one case, tied to the most theoretical reaches of physics. There are familiar examples of definition-like statements, such as "all bachelors are unmarried men", which would seem to be untouchable by the weird reversals of physical science. Our acceptance of these sentences and their trivial consequences seems to owe nothing to observation and everything to whatever it is that makes the relevant sound pattern (or inscription type) into an intelligible sentence of English. So there seems to be a substantial difference between these cases and scientific ones. Putnam has filled out this intuition with characteristic ingenuity (1962). We can illustrate in terms of the dictum about the straight line. "Length" (as in "path of minimal length") was a *law cluster term*—this is Putnam's expression. That is, it occurred in a cluster of statements of natural laws, each relating length to other things, thus providing a number of criteria for the application of the term. With the advances of twentieth century physics it was found that these criteria would sometimes give divergent results; so at least some of the criteria in at least some contexts of application had to be abandoned.[1] "Bachelor" by contrast is not a law cluster term. It has just one criterion of application, Putnam argues. Drop that and you simply change the meaning of the sound (inscription) "bachelor", as there is nothing else, no common thread, which makes it the case that the sound (inscription) is still being used for the kind of thing it was used for in the past. It might as well be soup. So such a change could not be a genuine change of theory; it would have to be a mere change of language. In other words, what is expressed by the sentence "All bachelors are unmarried" with its current meaning cannot be disbelieved. This is the essence of Putnam's case for saying that it is analytic. A similar argument can be put for a host of similar examples, like "Vixen are female foxes".

But now suppose a bachelor agrees to marry a refugee, to save her from deportation to a country suffering civil war and disease. He has been told about her by people he trusts but has never met her; and after the marriage ceremony will never see her again. In such a case one might rationally come to hold that he remains a bachelor though married, on the grounds that the best overall theory for explaining social phenomena counts a man in this position as a bachelor along with other males who live alone. Of course there may still be a special legal use of "bachelor", just as there is a legal use of "guilty" according to which one is not guilty of a crime until one has been declared so as a result of a legal trial. But really the man in our story would remain a bachelor, just as a murderer whom the jury finds innocent would really be guilty. (Being married, according to the hypothetical theory, is also not a purely legal matter: our bachelor counts as married because he has undergone a ceremony socially regarded as a public declaration of intent to live together with the other central participant of the ceremony and nothing else has occurred to nullify the force of this.) We are supposing that discoveries in social science may bring about a systematic re-evaluation of sentences including the sentence "all bachelors are unmarried". Would this be nothing more than a change of language? No, there has been a change of theory as well, our social theorist can reply: in our new theory marital status is regarded as much less significant; it turns out that marital status, unless set in a theory of byzantine complexity, is such a poor predictor of social behaviour that it is quite misleading to use it as a criterion of social classification.

[1] According to Quine, the choices made as to what should be dropped were the offspring of pragmatic considerations: a change of theory for handling hitherto inexplicable data with least overall disruption and most overall simplicity. This is not disputed by Putnam.

What about the definition "Vixen are female foxes"? Suppose that we found some foxes with both male and female genital organs and zoologists classified them as neither male nor female, but as hermaphrodite. Suppose it was also found that hermaphrodites rarely play both male and female roles. Zoologists may then classify a hermaphrodite who plays the female role biologically and socially, bearing and rearing cubs, as a vixen along with female foxes. Some vixen, then, would not be female but hermaphrodite. Before the discovery of hermaphrodite foxes, foxes bearing and rearing cubs were counted as vixen. Following the discovery it might be more disruptive to abandon this field criterion of vixenhood than to abandon the gender criterion, even though this had been held a definition. If so, it would not be irrational to reject the statement that vixen are female foxes. This would be a change of language use; but it would also be part of a rational theory change occasioned by novel observations.

These possibilities suggest that it makes no difference that terms such as "bachelor" and "vixen" are not law-cluster terms and are one-criterion terms.[2] It seems to be enough that we can have theories involving the term in question. In such cases the criterion may change as part of a theory change due to attempts to accommodate new data (or new attempts to accommodate old data) with least disruption and most simplicity. In later papers Putnam has argued that there is at least one true statement which is a priori in the sense that accepting it is rational but subsequently rejecting it would be irrational whatever our future experience (Putnam 1979). This one statement is that not every statement is both true and false. Putnam's idea is that rejecting this claim amounts to accepting and rejecting anything and everything, and this one cannot do on pain of irrationality. But rejecting the claim might turn out to be saner than Putnam suggests. For in the course of our investigations into the nature of logic and language we might conclude a number of things about truth which taken together entail the rejection. For instance we might come to accept the familiar claims that truth is relative to a language or language fragment and that no language fragment can contain its own truth-predicate; we may in addition come to hold that truth is a matter of degree and that there are no maximal degrees of truth and falsehood (having the order-type of an open interval of reals, say). Coming to regard these propositions as having a high degree of truth in some relevant fragment of English, we may also take it that, for any given language fragment L, the sentence of the form "every L-statement is L-true to some degree and L-false to some degree" has a high degree of M-truth, where M is a semantic metalan-

[2] The acceptability of Putnam's claim that these are one-criterion terms depends on what constitutes a criterion. There are several tests (criteria) we may use for deciding whether someone is a bachelor, though there may be only one predicate which we treat as a defining condition (criterion) of bachelorhood.

guage for L. In this situation we should reject the saying that not every statement is both true and false, on the grounds that it fails to be properly specific, there being no reference to a language fragment; and even if context supplies the missing reference to a language fragment L, we might reject the claim as incompatible with the theory that any instance of the schema "every L-statement is L-true to some degree and L-false to some degree" has a high degree of truth in the relevant metalanguage. This would not amount to accepting and rejecting any and every statement whatever.

One might change the example to make it harder to tell this kind of story; and I am far from sure that I could fill out the story given in a coherent way. But this would show only the limits of my ability to conceive certain possibilities. It is not part of the Quinean position that for any current belief, however firmly held, we are currently able to imagine a set of circumstances in which it would be rational to reject it. On the contrary, we may explain the common conviction that some sentence is unrevisable as due to a current inability to conceive of circumstances in which it would be rational to reject it. Quine's claim is merely that, for any dictum, such circumstances might obtain, not that we can currently conceive of them. Notice also that Quine's view is consistent with the possibility that there is a genuine psycholinguistic difference in the way we handle sentences we are inclined to regard as definitions.[3] Holding certain sentences true as linguistic fixed points, as beyond test, may be a genuine sentential attitude, with practical benefits most of the time. The prevalence of such an attitude may help explain the persistent conviction that certain sentences are analytically true and beyond rational revision. But that conviction is not *justified* by the prevalence of the attitude. Our attitude to a sentence we currently hold true as a linguistic fixed point may change in the light of future empirical discoveries; such a change of mind need not be irrational. Hence Quine's view remains untouched by its most persuasive critics and can be elaborated to account for much of the resistance to it.

2. Concepts

Nonetheless my claim is that one of the main morals drawn from Quine's work— the moral that there is no a priori discovery—is wrong. The central idea is that we can acquire beliefs by means of reliable belief-forming dispositions due to our possessing certain concepts. What is a concept? A

[3] I got this point from Paul Horwich.

concept, as that term is used here, is a constituent of a thought, and a thought is a content of a possible mental state which may be correct or incorrect and which has inferential relations with other such contents. Thoughts are not defined as that which synonymous sentences have in common; and concepts are not defined to be meanings of words or phrases. Neither thoughts nor concepts are here taken to be linguistic entities at all. This is not to deny that some thoughts can, in certain contexts, be expressed by uttering or writing a sentence.

Why assume that thoughts have constituents? Without them there would not be inferential relations between thoughts. The thoughts that ants are smaller than mice and that mice are smaller than hogs together entail the thought that ants are smaller than hogs. This entailment depends on there being a common constituent, here signaled by the phrase "smaller than", in all three thoughts. Concepts are typically constituents of thoughts on which some of their inferential relations depend. Concepts on this view are abstract. So what is it for a thinker to possess a concept? Peacocke (1992) manages to answer this question in a way which neatly ties together the various strands mentioned here, in his path-breaking work. He shows how a concept may be individuated by specifying the condition under which a thinker possesses the concept. To illustrate I give the possession condition for a concept *plus* for the positive finite cardinals. Following developmental psychologists I call these cardinals "numerosities"; and I use the term "collections" for finite non-empty sets.

> The concept $PLUS_{num}$ is that concept C which one possesses if and only if one finds inferences of the following types primitively compelling:
>
> $$\frac{s,t \text{ are disjoint collections and } \mathrm{num}(s)=n \text{ and } \mathrm{num}(t)=m}{\mathrm{num}(s \cup t) = n\mathrm{C}m.}$$
>
> $$\frac{\mathrm{num}(r) = n\mathrm{C}m}{\text{for some disjoint } s \text{ and } t,\ s \cup t = r \text{ and } \mathrm{num}(s)=n \text{ and } \mathrm{num}(t)=m.}$$

Two points of clarification. The first is about notation. The letter "C" here is just a variable, like the "x" in: $\sqrt{2}$ is that positive number x such that x multiplied by itself equals 2. It is a variable which ranges over concepts of a specific category, which we may loosely think of as concepts of binary functions. "num(s)" abbreviates "the numerosity of s" and "$s \cup t$" abbreviates "the collection of everything in s and everything in t". Secondly, one finds an inference primitively compelling just when one finds it compelling—if one were to judge the premiss (or premisses) true one would be at least as sure of the conclusion—and one's finding it compelling is not in turn based on some reason. What is the point of this qualification? You will find many inferences involving $PLUS_{num}$ compelling. For example:

$$\frac{\text{num}(s) = a+b.}{\text{num(s)} = \sqrt{(a^2+b^2+2ab)}.}$$

(Here "+" abbreviates "$PLUS_{\text{num}}$".) It is obviously too strong a requirement for possessing this concept that one must find all of these inferences compelling. So we must ask: which inferences, out of the ones we find compelling, are the ones we *must* find compelling in order to possess the concept? We clearly need to exclude those types of inferences involving the concept which have *become* compelling as a result of some reasoning. For that would entail that those inferences were understood (and so the concept was possessed) prior to our finding those inferences compelling. We find the type of inference in the example just given compelling because we have inferred its validity from a prior belief, namely

$$(a+b)^2 = (a^2+b^2+2ab).$$

We must already have had the concept $PLUS_{num}$ in order to have this belief. So, finding that inference compelling cannot be required for having the concept.

It should not be assumed that there is a unique concept expressed by the word "plus", or that for any two concepts so expressed one is a restriction of the other. A concept of addition for finite continuous magnitudes will not be so related to a concept of addition for cardinals including the transfinite. Even when we restrict attention to the discrete and the finite, there is diversity. Besides the concept given above there is a concept for addition of positive finite ordinals. For example, the concept $PLUS_{finord}$ is that concept C to possess which one must find inferences of the following types primitively compelling:

$$\frac{x \text{ is the } n^{\text{th}} \text{ item after the } m^{\text{th}} \text{ item in a sequence}}{x \text{ is the } (m\text{C}n)^{\text{th}} \text{ item in that sequence}}$$

and the reverse. This diversity is consistent with the fact that there is a more abstract concept of addition applicable to both finite ordinals and finite cardinals (including their zeros). Thus we make room for the possibility that one acquires a more comprehensive abstract concept only after operating with one or both of the less abstract concepts.[4]

Concepts of other arithmetical operations on numerosities can be specified in the same way, that is, in terms of the types of inference that one must find primitively compelling if one has the concept. For each of these

[4] For more on diversity and its importance see Giaquinto (1995).

concepts there are two types of inference, one for introducing the concept, the second for eliminating it. Here they are for three basic operations.

$MINUS_{num}$

$$-i \quad \frac{t \text{ is a subcollection of } s \text{ and num}(t)=m \text{ and num}(s)=n}{\text{num}(s{\sim}t) = n-m.}$$

$$-e \quad \frac{\text{num}(r) = n-m.}{\text{for } t \text{ disjoint with } r \text{ and num}(t)=m,\ \text{num}(r\cup t) = n.}$$

$TIMES_{num}$

$$\times i \quad \frac{s \text{ is the union of } n \text{ disjoint collections of numerosity } m}{\text{num}(s) = n\times m.}$$

$$\times e \quad \frac{\text{num}(s) = n\times m}{s \text{ is the union of } n \text{ disjoint collections of numerosity } m.}$$

$DIVIDED\text{-}BY_{num}$

$$/i \quad \frac{\text{num}(s)=n \text{ and } s \text{ is the union of } m \text{ disjoint collections of equal numerosity } z}{n/m = z.}$$

$$/e \quad \frac{n/m = z}{\text{if num}(s) = n,\ s \text{ is the union of } m \text{ disjoint collections of numerosity } z.}$$

3. A conceptual route to knowledge

Possessing these concepts involves having a number of inferential dispositions. For example, if, having the concept $PLUS_{num}$, you were to judge[5] of some collection r that its numerosity is $n+m$, you would find it compelling that r is the union of disjoint collections of numerosities n and m, without further reasons. Schematically, you are disposed to believe $\phi(r)$ upon judging $F(r)$, without further reasons. If you are aware of this, do not distrust it, and possess a concept for restricted universal quantification, you will believe the corresponding generalisation: Every F satisfies ϕ.[6] In this case the corresponding generalisation is: Every collection of numer-

[5] Believing is a state; judging is an occurrence. Specifically, one judges a thought true when in thinking the thought occurrently one accepts it or mentally endorses it.

[6] Here I am supposing that possessing a concept for restricted universal quantification includes finding inferences of the following type primitively compelling:

$$F(c) \text{ entails } \phi(c), \text{ for any designator } c; \text{ so } \forall F(x)[\phi(x)].$$

osity $n+m$ is the union of disjoint collections of numerosities n and m. So here is one example of a belief one may acquire simply as a result of having certain inferential dispositions essential for having constituent concepts of the belief, together with a minimal self-awareness. This belief is the generalisation arising from $+e$, the elimination inference for $PLUS_{num}$. In the same way we can acquire belief in generalisations arising from the inferences which characterise other concepts. One to be used shortly is the generalisation arising from $\times e$: Any collection of numerosity $n \times m$ is the union of n disjoint collections of numerosity m.

Now suppose that in addition to these concepts one has familiar logical concepts[7] and a concept of numerical equality that makes compelling the substitution of equals for equals. Then one can arrive at non-trivial beliefs by means of the inferential dispositions that are essential to having these concepts. An example is belief in the basic relation between $TIMES_{num}$ and $DIVIDED\text{-}BY_{num}$:

(#) $h = j \times k$ if and only if $h/j = k$.

Here are moves in thought, with some ellisions,[8] leading to belief in the left-to-right half of this biconditional. The listing is not meant to indicate temporal sequence; obviously an inferred thought occurs after activation of the relevant inferential disposition, but we should not rule out the possibility of inferences occurring in parallel.

Let

(A) $h = j \times k$.

Then by logical inference from (A)

(B) Any collection of numerosity h is a collection of numerosity $j \times k$.

The generalisation arising from $\times e$ is

(C) Any collection of numerosity $j \times k$ is the union of j disjoint collections of numerosity k.

Then by logical inference from (B) and (C)

(D) Any collection of numerosity h is the union of j disjoint collections of numerosity k.

Then by $/i$ from (D)

(E) $h/j = k$.

Then discharging the assumption (A) gives the conditional

[7] Suppose in particular one has a concept of conditionals which makes compelling the move of discharging an assumption P used to reach Q by weakening the conclusion to $P \rightarrow Q$; a concept of restricted universal quantification that makes compelling $\forall Fx[Fx]$, and the move from $\forall Fx[Gx]$ and $\forall Gx[Hx]$ to $\forall Fx[Hx]$; a concept of equivalence that makes compelling the move from $P \rightarrow Q$ and $Q \rightarrow P$ to $P \leftrightarrow Q$.

[8] The logical moves are glossed over but can easily be supplied.

(F) if $h = j\times k$, $h/j = k$.

There is a corresponding route to the converse conditional.

Some clarification is needed here. What I have presented looks suspiciously like a justification of a belief one already has. Can it also be an account of a process leading to belief? Yes, if we add in some background. A number of transitions in thought are listed. Something must get them going, some mode of activation, mental exploration, focussed on connections between the arithmetic operations (under the given concepts). This directed exploration need not occupy conscious attention and need not be under voluntary control. This mode provides the motivating power to get occurrent thoughts from belief states, e.g. the judgement (C), and the motivating power to make inferential dispositions available (or ready) for activation by the occurrence of a thought, e.g. the readiness of /*i* for activation by (D).

Is this way of getting the belief # (i.e. that $h = j\times k$ if and only if $h/j = k$) epistemically acceptable? This breaks down into two questions: Is this way of acquiring the belief reliable? Does it involve any violation of epistemic rationality? If the belief is acquired in the manner described it is the result of nothing but the activation of a number of inferential dispositions, dispositions resulting from possessing concepts which are constituents of the thought believed.[9] Thus the question of reliability boils down to this: Are those dispositions reliable? Such a disposition is reliable if, whenever activated, the inferred thought would be true were the thoughts it was inferred from true. A routine check on the inferential dispositions involved shows that they are reliable. To check /*i*, for instance, we just need to see whether, if a thought of the form "num(s)=n and s is the union of m disjoint collections of equal numerosity z" were true, the corresponding thought of the form "$n/m = z$" would also be true.[10]

Acquiring a belief by activation of reliable inferential dispositions and conditional weakening cannot in itself be irrational, given that the aim of belief is truth. That is because an inferential disposition is reliable only if its activation does not involve inferring an untruth from a truth; so a belief arrived at by conditional weakening on the result of an inference will be true, given reliability. Nonetheless, there are conditions under which acquiring a belief by means of reliable inferential dispositions, or

[9] Perhaps conditional weakening (discharging an assumption P used in getting conclusion Q and weakening the conclusion to $P \rightarrow Q$) is not, strictly speaking, an *inferential* move. If so, the corresponding disposition is also not inferential. But for simplicity of exposition we can assimilate it to the move from "P entails Q" to "$P \rightarrow Q$".

[10] It might be argued that a stronger kind of reliability is needed here. The dispositions involved in this example survive the other plausible accounts of reliability that I know of.

maintaining a belief so acquired, violates rationality. Let α be a belief acquired by means of reliable dispositions. Suppose one is aware of having beliefs inconsistent with α and of lacking grounds for greater confidence in α than in the beliefs inconsistent with it. In this circumstance rationality demands that one does not believe α (or at least not with full confidence). Another such condition would be having a rational conscious (but false) belief that the way in which α was acquired (and sustained) is unreliable. There are probably other defeaters, conditions under which it would be irrational to come to believe a certain proposition or to continue to do so, though that belief was acquired by reliable means.

But there is no good reason to think that avoiding defeaters is impossible or even difficult. The contrary thought probably results from a mistaken view of rationality requirements. An example is the common view that consistency of one's belief set is required for rationality. (This is too harsh because it overlooks the possibility of arriving at a number of jointly inconsistent beliefs, each with justification, when the inconsistency is extremely difficult to detect. In this case the believer would be unlucky but not necessarily irrational.) So it is possible, perhaps easy, to get a belief by activation of a reliable belief-forming disposition and keep it, in the absence of defeaters. Thus no irrationality need occur in getting belief # in the manner indicated and retaining it.

As this way of getting the belief is reliable and need not involve any violation of epistemic rationality, it is epistemically acceptable. As the belief is true, the resulting belief state counts as knowledge on some current views of propositional knowledge. Even if you think that propositional knowing requires that some further condition be fulfilled, we might agree that true beliefs which are reliably and rationally acquired and retained have a valuable epistemic status akin to knowledge. Belief states having this epistemic status—I will assume that it is knowledge for ease of exposition—can be conceptual, in that they result from the activation of inferential dispositions essential to possessing concepts which are constituents of the thought, without the use of experience as evidence. That is what is illustrated by the way of getting belief # sketched earlier. This is just one example. Elsewhere I have illustrated the same point by presenting a conceptual route to the belief that the triangles either side of a diagonal of a Euclidean square are the same in size, and I see no reason why belief in non-mathematical truths cannot be acquired in the same way, reliably and without defeaters. Hence the possibility of conceptual knowledge.

4. A priori yet revisable

This way of coming to know # is conceptual, in that it depends causally on the activation of inferential dispositions essential to possessing concepts which are constituents of the thought; and it is a priori in that no experience is used as evidence in the process of getting the belief. In this sense there is conceptual a priori knowledge.

Claims of this sort are liable to provoke a hostile response. "There is no such thing as analytic knowledge, knowledge by grasping the meanings of expressions, concepts or whatever. This is the advance that Quine represents over Carnap." The argument behind the hostile response is this. Any sentence we take to be true might come to be rationally rejected as false in the light of experience, and there would be nothing which would make such an event a change of language and not a change of theory. This applies to the sentence I used to express #. It might get swept into the bin of falsehood in a systematic revision of our assignment of truth values to sentences in making best sense of experience. Thus the rationality of our currently assigning it truth does depend on that assigment's compatibility with a total assignment which fits well with experience. In short, rational acceptance of it depends on experience. So, the objection runs, our coming to believe # in the a priori manner described earlier cannot result in knowledge or anything epistemically akin to knowledge.

This involves an equivocation about *dependence*. One can say that rational acceptance of something depends on experience, having in mind that it is rationally revisable in the light of experience. But one could also mean that rational acquisition of the belief must be based on experience, that there must have been some experience which was used as evidence in reaching the belief. The former means that the rationality of *holding on to* the belief depends on the *absence* of countervailing experience; the latter means that the rationality of *getting* the belief depends on the *presence* of supporting experience.[11] We could mark the distinction by saying that if a belief is rationally revisable in the light of future experience, its retention is negatively dependent on experience; and if a belief cannot have been rationally acquired unless some experience was used as grounds in the process, its acquisition is positively dependent on experience. The final inference of the objection is, in effect, an inference from the negative experience-dependence of retention to the positive experience-dependence of acquisition. Why should we accept this inference? Why assume

[11] I do not suppose that what counts as countervailing and supporting experience for a claim is determined by that claim alone. On a Bayesian response to Duhem's lesson, the degrees of confidence we have in other claims will be a factor.

that a belief which is vulnerable to experience cannot have been rationally acquired in an a priori manner? There is nothing in Quine's arguments which justifies this assumption. Moreover, Quine allows for the possibility of genuine a priori acquisition when he says:

> Now the very distinction between a priori and empirical begins to waver and dissolve, at least as a distinction between sentences. (It could of course still hold as a distinction between factors in one's adoption of a sentence, but both factors might be operative everywhere.) (Quine 1960, § VI)

The sentence in parentheses suggests that there might be distinctively a priori factors in acquisition; by claiming only that they *might* always be accompanied by empirical factors he allows for the possibility that in some cases they might not.

Suppose that you followed a long proof that A deductively entails B, where A and B are mathematically complicated propositions, and that you came to believe $A \rightarrow B$ as a result, and that there are no defeaters, no reasons you are aware of for doubting the result or the legitimacy of the way you arrived at the conclusion. The belief will have been rationally acquired. Sometime later you and the experts you trust find yourselves able to explain some new phenomena only on the assumption that A holds in the physical world but not B. If the phenomena explained by your explanatory model are sufficiently impressive, it might well be rational to revise your attitude to the claim that $A \rightarrow B$, and to believe that the attempted proof had some unnoticed slip or used some established logical rule which in fact has exceptions. That is, experience might lead to rational rejection of $A \rightarrow B$ even if it is true and the argument you followed really was a proof and there were no ulterior circumstances undermining the rationality of your coming to believe it that way. That would be a case in which retaining the belief depended negatively on experience though acquiring it did not depend positively on experience. The view put forward here is that conceptual acquisition of a belief is not positively dependent on experience, i.e. the belief can be rationally acquired without the use of experience as evidence for it. This is consistent with the possibility that its retention is negatively dependent on experience, i.e. rationally deniable in the light of experience—and that is what the Quinean considerations argue for.

Quine noted the contrast between acquisition and retention; I would like to stress the contrast between positive and negative dependence on experience. If a belief can be rationally acquired without the use of experience as evidence for it, as is claimed here, it can also be rationally retained without the use of experience as evidence for it, as long as the believer has no reason to question it. In such cases neither acquisition nor retention is positively dependent on experience. Thus there may be rational a priori retention as well as rational a priori acquisition of a true belief. If, in addition, the belief was reliably acquired it would be a priori knowledge, on some accounts of knowledge. All this is consistent with the claim that retaining the belief is negatively dependent on experience: something known a priori may be rationally revisable in the light of possible future experience.[12]

5. Conceptual but not analytic

You may still believe that thoughts and concepts, if there were such things, would be sentence meanings and word meanings respectively, even though thoughts and concepts were not introduced that way in this paper. You may also think that the process of belief acquisition described earlier is nothing more than deduction from definitions or statements of meaning. So conceptual knowledge would just be analytic knowledge in other terms, and this does clash with the central Quinean theme.

On the view presented here, thinking a thought is a mental occurrence, and believing a thought and possessing a concept are mental states, each with a neural basis (perhaps different in different thinkers). Thoughts and concepts, then, are theoretical entities in psychological explanation. If there were a sound argument for the claim that entities playing the role here ascribed to thoughts and concepts would have to be linguistic meanings, that might be good news for linguistic meanings, rather than bad news for thoughts and concepts. It would depend ultimately on whether cognitive science needs to posit such entities. However, it is idle to speculate on the matter until we have a sound argument for identifying thoughts and concepts with sentence and phrase meanings. To the best of my knowledge no such argument has been presented.

But there is a challenge here. How else is thought related to talk, given that there really are thoughts, if thoughts are not sentence meanings? There is growing evidence that thinking a thought is not inner talk, especially in connection with numerical reasoning.[13] In the other direction, lit-

[12] Peacocke (1993) also draws conclusions about the a priori from his theory of concepts, but his differ from mine. Peacocke's "a priori" is a property of thoughts (not of ways of acquiring beliefs). He argues that some truths are "knowable in advance of any empirical information about the way the world is" because they are a priori (in his non-epistemic sense). My concern is to show that some truths are knowable a priori in an epistemic sense and that this is compatible with Quine's revisability thesis. Peacocke does not claim this.

[13] There is substantial evidence of numerical reasoning in non-human animals (Church and Meck 1984; Capaldi and Miller 1988; Boysen and Berntson 1989), human infants (Wynn 1992), and patients with severe, even total aphasia (Rossor et al. 1995). There is also evidence of physical thinking in human infants (Leslie 1988; Spelke 1988).

eral talk is not always thought made loud. Suppose one wants to communicate the result of adding certain weights, and does this by saying "38 pounds plus 27 pounds is 65 pounds in total". The speaker could have used the word "plus" here to express one of many concepts of addition, a concept appropriate for continuous magnitudes, or a concept for discrete magnitudes; and, if for the latter, a concept for integer values only, or for fractions as well; a concept which makes primitively compelling an inference to the result of correctly determining the magnitude of an aggregate, or a concept too abstract for this; and so on. More likely, however, is that the speaker has no idea precisely which concept of addition was involved in the thought that prompted her assertion, would have no answer if asked which concept she intended to express by her use of the word "plus" and does not care anyway. In this case the speaker would not be using the word "plus" to express a concept at all. As no single concept of addition is expressed by the word, no single thought is expressed by the sentence. Yet this could be a case of successful non-metaphorical communication. So information can be linguistically communicated (or recorded) without the expression of an individual thought. This is not to deny that sentences can be used to express thoughts, and subsentential phrases can be used to express concepts. But the precision of intention necessary for this might be rare. Thus the relations between thought and talk are unlikely to be simple, direct, and context-free.[14]

What of the charge that the process of belief acquisition described earlier is nothing more than deduction from definitions of "+" and "×"? On my account, the process of reaching belief # does indeed resemble a deduction, and this is no accident. Perhaps it is a deduction, if that term is used psychologically, for a flow of truth-preserving transitions between occurrent thoughts. But the process of acquisition itself—in contrast to the process of following my description of it—does not involve the exercise of any linguistic ability; in particular it does not involve using knowledge of word meanings or of relations of synonymy between linguistic expressions. The symbols "+" and "×" are used in my account of the process to stand for concepts. The process of belief acquisition does require possession of those concepts; but it does not require knowing that the symbols express those concepts. So there is no question here of discovering an arithmetical truth by analysis of linguistic meanings. The discovery is conceptual, but not analytic.

[14] Moreover, the constituents of thoughts—concepts—are unlikely to be identical with word meanings, assuming that our lexicons individuate meanings fairly well, since concepts are just too fine-grained: there will often be many concepts conforming to a single lexical entry.

6. Thought, talk and theory-change

No statement is immune to revision, Quine says. The simplest and least disruptive way of reconciling our beliefs with surprising new findings might require drastic re-assignments of truth values to sentences, including the rejection of those we previously regarded as definitions. When there is a drastic theory change, requiring systematic re-evaluations across the board, some beliefs will go and others will remain. If beliefs are attitudes to thoughts which need not be tied to sentences, as is suggested by the mounting evidence against the hypothesis that thought is inner talk, a belief can remain even when the sentence previously most used to express it has been rejected as false. In other words, a re-assignment of truth values to sentences can indicate some belief change, without a revision of attitude to all the beliefs that were expressed by the re-evaluated sentences. Consider the sentence

(EU) Between any two points there is exactly one path of minimal length.

In the context of pure mathematics before the discovery of non-Euclidean spaces, sentence (EU) was held true. Since the discovery of non-Euclidean spaces, we would say that in some spaces, including Euclidean spaces, (EU) is true; in others not. But we would not grant that (EU) is true outright. Of course, if it was uttered in a context which made it clear that Euclidean spaces were under consideration, we would say that the utterance was correct or that a true thought was expressed. But that true thought is a mathematical thought which (EU) was used to express without (implicit or explicit) qualification, prior to the discovery of non-Euclidean geometry.[15] Thus one of the beliefs expressed by a rejected dictum remained. Still, this was not a *mere* change of language. The change in evaluation of (EU) was part of a larger systematic re-assignment of truth-values to sentences. This larger upheaval involved a significant change of theory. For instance, it came to be believed that physical space might not conform to Euclid's axioms, that such a failure is a mathematical possibility. This and other such changes of belief (actually not occasioned by an *empirical* discovery) required a systematic alteration of geometrical talk, including the change in the use of sentence (EU).

An a priori process involving some of the geometrical concepts that gave rise to Euclidean geometry can result in a belief that (EU) was once used

[15] That sentence may also have been used to express a number of false thoughts, e.g. that between any two points *in physical space* there is exactly one path of minimal length, or that between any two points there is *necessarily* exactly one path of minimal length. Also, it could have been used without sufficient discrimination for expressing any single thought.

to express, whether or not the believer is aware of non-Euclidean geometries. The same thought with the same constituents—Euclidean geometrical concepts among them—can have been believed by ancient and recent mathematicians alike; moreover they can have acquired the belief in the same way. But they could not express it in the same way, since our contemporaries must indicate their intention to exclude non-Euclidean spaces. For this reason it is misleading to regard the dethronement of Euclidean geometry as the discovery that it is false. The Euclidean thoughts are true, but their constituent concepts have restricted application—a fact which led us to qualify our expression of those thoughts. Euclidean geometry is not an isolated case. For a numerical example consider the sentence

(R) Negative numbers have no square root.

Before the discovery of the complex numbers this sentence was held true. Since that time we would say that (R) is true in the real number system but false in the complex number system. We would no longer accept that (R) is true without qualification. Of course, in a context in which it is clear that only the real numbers are under consideration, (R) can still be used to express a true thought. That true thought was already believed before the complex numbers were introduced and was no doubt expressed by utterance of R. The change of language that was necessitated by discovery of the complex numbers was accompanied by a change of belief: it had been believed that there was no system of numbers in which a negative number has a square root; after Gauss this was disbelieved. But something was preserved, namely, the thought that we would now express by uttering (R) when only the real number system is relevant.[16]

At the time that Quine was first challenging the view that there is a class of analytic truths, behaviourism was predominant in philosophical as well as psychological views of the mental. On certain behaviourist views of thought and belief, such as that there is no more to having a belief than a disposition to assent to a sentence of a public language, the Quinean view is incompatible with the possibility of belief preservation coupled with theory change. Given that behaviourist view, you simply could not lose your readiness to assent to a sentence while maintaining the belief it was used to express. However, the behaviourist view of thought and belief is an assumption increasingly at odds with the findings of cognitive psychology and has no independent justification. To the extent that Quine is committed to behaviourism, the views just presented are inconsistent with Quine's. But Quine's enduring observations about language can be uncoupled from behaviourist assumptions; thus liberated, Quine's position can accommo-

[16] This example was prompted by another, suggested by David Auerbach: the thought expressed by the Attic Greek for '2 has no square root' before discovery of irrational numbers.

date the examples of preserved belief in the midst of theory change. What the liberated position maintains is that any belief may be rationally rejected in the light of future findings; what it has to accommodate is that some beliefs may be rationally retained even when their customary linguistic expressions become unacceptable. These are not inconsistent.

The examples of theory change used here, those due to the discovery of non-Euclidean spaces and the complex number system, suggest another elaboration of the Quinean view. In the original picture, adjustments in the interior of the fabric of established beliefs are occasioned by conflicts with experience at the periphery. But conflicts with experience are not the only generators of rational change. The mathematical examples show that changes can be forced by the acquisition of new concepts not prompted by the need to accommodate recalcitrant data. The discovery of non-Euclidean spaces antedated formulation of the General Theory of Relativity. The motive force for this discovery, as for the discovery of the complex numbers, was zeal for purely mathematical exploration, without thought for empirical applications.[17] Hence there are empirical and a priori factors operating independently, perceptual experience at the periphery and conceptual discoveries in the interior.

7. Conclusion

Quine argued that the doctrines of analyticity and verificationism were dogmas of empiricism, that is, doctrines unsupported by the available evidence. In the light of the above considerations, unmixed empiricism itself looks to be a dogma. In particular, the lack of evidence for a realm of analytic knowledge does not establish empiricism, since there may be a non-empirical mode of knowledge, conceptual knowledge, which is also non-analytic.[18]

Department of Philosophy
University College London
Gower Street
London WC1E 6BT
UK
marcus.giaquinto@ucl.ac.uk

M. GIAQUINTO

[17] See Gray (1979) and Crossley (1980) for details.

[18] I would like to thank Michael Resnik and David Auerbach for stimulating discussions and Michael Resnik for helpful comments on an earlier version of this paper. I would also like to thank W.D. (Bill) Hart for many discussions on these topics when we were colleagues.

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