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Qualities and Concepts

> By a quality I mean that in virtue of which things are said to be qualified somehow.
>
> Aristotle, *Categories*

40. Qualities, Connections, and Conditions

All objects have countless properties and stand in countless relations. Most of these properties and relations are of little interest, however, for most are not genuine *qualities* or *connections*. Qualities, Aristotle tells us, are that in virtue of which things are said to be qualified. Connections, analogously, are that in virtue of which things are said to be connected. But these remarks taken alone are not very helpful, true though they may be; elucidation is needed.

Examples of properties and relations that are commonly thought to be qualities and connections might be helpful at the outset.[1] There is a widespread belief that certain qualities and connections—called phenomenal qualities and connections—can be known in experience. Examples of such qualities would be colors, tastes, sounds, smells, shapes, textures, hot and cold, and inner feelings (of the sort associated with emotions). And examples of such connections would be the conscious operations of mind themselves, e.g., sensing, feeling, (conscious) thinking, (conscious) wanting, (conscious) deciding, etc. Theories provide another source of examples of properties and relations that are thought to be qualities and connections. In contemporary physics, for example, the quark-theoretic properties of charm, strangeness, color, etc. are typically thought of as qualities. Or in Mendelian genetics traits are thought of as qualities, and the relation of inheritance is thought of as a connection. The relation of gravitational attraction in classical physics, the relation of association in associationist psychology, the relation of stimulation in behavioral psychology, the relations of perceiving, believing, wanting, and deciding in cognitive psychology: these are all thought by the proponents of the respective theories to be connections. One more example of a connection would be the predication relation from logical theory.

Properties and relations that are not genuine qualities and connections may be called *Cambridge* properties and relations.[2] Perhaps the most notorious Cambridge property in recent philosophical literature is the property grue, i.e., the property of being green if examined before *t* and blue otherwise. An example of a Cambridge relation would be the relation holding between things *x* and *y* such that *x* is green and *y* is blue.

Examples can help to impart the intuitive distinction between genuine qualities and connections, on the one hand, and Cambridge properties and relations, on the other; but examples only go so far. Something else that can be done is to draw attention to the special roles that qualities and connections play, or at least ought to play, in descriptions of experience and in theories.

It would seem that we experience colors, smells, sounds, hot and cold, inner feelings, the conscious operations of mind, etc. But Cambridge properties we cannot experience; for example, nothing could reasonably count as experiencing grue. In this way phenomenal qualities and connections play a fundamental role in the constitution of experience. Because of this, one's phenomenal descriptions are, or at least should be, given in terms of genuine phenomenal qualities and connections, not Cambridge properties and relations. To dramatize this point, consider an example. Suppose that for a certain duration of time ending at *t* everything looks green to me and then suddenly everything looks blue. There will have been a distinct change in my experience. This change will be registered in my phenomenal description if that description is given in terms of the qualities green and blue. But if instead the phenomenal description is given in terms of certain Cambridge properties, the change might not be registered. Indeed, the very concept of change in experience would be unintelligible without the logically prior concepts of quality and connection. And much the same thing goes for the concepts of orderliness and disorderliness in experience.

Qualities and connections also play a fundamental role in theories.[3] Changes in the world consist primarily of changes in the qualities and connections of things in the world. So theoretical descriptions and explanations of change, if they are to be adequate, must be given in terms of genuine qualities and connections; Cambridge properties and relations enter in only secondarily.[4] In much the same way, qualities and connections, but not Cambridge properties and relations, play a primary role in the objective, non-arbitrary categorization and identification of objects. Why an object is the particular kind of object it is must be explained in terms of its qualities and connections. And why an object continues to be the same thing that it was earlier must be explained in terms of continuities and changes in its qualities and connections.

The picture that emerges, then, is that qualities and connections are determinants of the phenomenal, causal, and logical order of the world whereas Cambridge properties and relations are idle in these respects.[5]

So far I have tried to give an intuitive indication of what qualities and connections are by providing various candidate examples and by indicating in a rough way the distinctive roles they play, or ought to play, in phenomenal description and in theory. One more way in which I will try to impart the concepts of quality and connection is by indicating the key role they can be expected to have in a solution to Nelson Goodman's new problem of induction.[6]

The degree to which inductive generalizations are epistemologically justified varies widely. Since inductive generalizations are performed on properties and relations, one source of the variability may be traced to the kind of properties and relations involved. For example, inductive generalizations on genuine qualities or connections (e.g., green and blue) have *ceteris paribus* a high degree of justification. And inductive generalizations on Cambridge properties or relations (e.g., grue and bleen) have *ceteris paribus* a low degree.[7] The reason for this is plain. The ideal inductive generalization begins with an observed order and projects it into a general order. But the very concept of orderliness is one that pertains to qualities and connections. When one says that things, observed or unobserved, are orderly, one implies that neat generalizations hold for relevant qualities and connections. After all, qualities and connections are the determinants of the phenomenal, causal, and logical order of the world. Consequently, in formulating the principle of induction one must pay special attention to the properties and relations upon which the inductive generalizations are performed. Goodman's new problem of induction is really just the problem of finding a formulation of the principle of induction that is acceptable in this regard. Even though this problem is not easy, its solution can at least be expected to be straightforward once one has at hand the concepts of quality and connection.

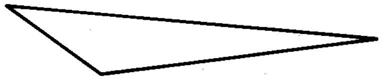
Considerable methodological confusion surrounds Goodman's problem, however. This is generated by a failure to properly distinguish the new problem of induction (i.e., the problem of finding a formulation of the principle of induction that is acceptable regarding the issue just discussed) from two further problems not at all new: one, a traditional metaphysical problem; the other, a traditional epistemological problem. The metaphysical problem is that of giving precise non-circular definitions of the concepts of quality and connection, and the epistemological problem is that of showing how in particular cases to successfully distinguish genuine qualities and connections from Cambridge properties and relations. A few methodological comments on these two traditional problems are in order.

The metaphysical problem of defining the concept of quality goes back at least as far as Aristotle, and the metaphysical problem of defining the concept of connection goes back at least as far as Hume. It is important to understand that these problems do not belong to epistemology (or philosophy of science for that matter), nor will they ever be solved by epistemological means. They fall squarely within traditional metaphysics. Fortunately they are foundational problems there, and this enables their solutions to be given by appealing to logical theory. The tradition of solving foundational metaphysical problems by the means of logical theory was established by Plato and Aristotle and pursued actively in medieval philosophy and has been continued in modern philosophy by such figures as Leibniz, Frege, and Russell. Working in the same tradition, I will employ a logic for PRPs to define the concepts of quality and connection.[8]

Deep traditional roots also underlie the epistemological problem of how in particular cases to distinguish genuine qualities and connections from other properties and relations. This problem—or at least a version of it—can be traced back to Plato, who was concerned with the question of how in particular cases to determine the identity of genuine forms as opposed to spurious ones.[9] Versions of this epistemological problem are also evident in nearly all the classical modern philosophers from Descartes through Kant. Now although this problem is quite difficult, it is not so resistant to solution as relativists think. For given the special role that qualities and connections play in phenomenal description—and in the constitution of experience itself—we may look to our experience to identify certain genuine qualities and connections, namely, phenomenal qualities and connections. (E.g., we can experience green but not grue. If we were unable to identify phenomenal qualities and connections in this way, we could not notice change or constancy in our experience, nor could we even identify so-called recalcitrant experiences.) Having done this, we may then seek causal explanations of why we experience the particular phenomenal qualities and connections that we do. Among the competing explanations, consider those that posit theoretical qualities and connections described solely in terms of known phenomenal qualities and connections, the concept of causation, the general concepts of quality and connection, and any other transcendentally justified concepts (i.e., any other concepts that are required in order to engage in theory construction at all). Since these explanations are all formulated with the same terms, one can straightforwardly compare their complexity without running into the relativist's worry that Cambridge properties and relations might sneak in under the veil of a superficially simple syntax of primitive theoretical terms. After doing this, one would be justified in identifying the simplest of these explanations as correct. Then, from this explanation one can extract an authoritative list of theoretical qualities and connections. Such a list would bring one a long way toward a solution to the epistemological problem. Suppose, however, that this procedure should fail to isolate a unique causal explanation—and, hence, a unique list of theoretical qualities and connections. The resulting situation would not be revolutionary; it would be just one more instance of the familiar problem of the underdetermination of theory by the data.

Given that qualities and connections form a special category of properties and relations, which of the two traditional conceptions of properties and relations applies to this special category? Consider an example involving shape. Take the following little object:

(1)



What shape is figure (1)? In answer to this question, one might say that (1) is triangular. Or one could equally well say that (1) is trilateral. Each of these answers suffices to inform us of its shape. The reason for this is that, intuitively, the quality of being triangular and the quality of being trilateral are the very same quality. They are how it is with (1) in regard to shape. Though the concept of being triangular and the concept of being trilateral are distinct, they correspond to the same quality of things in the world. Indeed, there is no limit to the number of necessarily equivalent ways to conceive of this shape. Yet there is only one shape. On conception 1, necessary equivalence is sufficient for identity while on conception 2 it is not. It would seem, therefore, that qualities and connections, including this shape, conform to conception 1 whereas concepts conform instead to conception 2. Qualities and connections are what fix the actual conditions in the world, and, as such, they do not exhibit distinctions finer than necessary equivalents. Concepts, on the other hand, pertain primarily to thinking about the world; it is in thinking that finer intensional distinctions show up.

Now consider the sort of things called *conditions*. Conditions are the sort of things that are said to obtain (or to be so). For example, the condition that (1) is triangular obtains, and the condition that (1) is circular does not obtain. Similarly, the condition that something is triangular obtains, and the condition that nothing is triangular does not. The conditions that obtain constitute, as we say, how it is in the world. They are the actual states of affairs.

Just as qualities and connections conform to conception 1, so do conditions. (Of course, conditions are 0-ary whereas qualities are 1-ary and connections are n-ary, $n \geq 2$.) To see this, consider again the example of figure (1). Intuitively, the condition that (1) is triangular is the same condition as the condition that (1) is trilateral. Indeed, the condition that (1) is triangular is intuitively the same condition as the condition that (1) is trilateral and $5 + 7 = 12$. And so on for all necessarily equivalent conditions. Conditions, like other non-intentional things, do not exhibit distinctions finer than necessary equivalents.

But how are qualities, connections, and conditions connected to one another? What for example is the connection between the quality of curving and the little figure (2) and the condition that (2) curves?

(2)

The answer is that the condition that (2) curves is the result of predicating the quality of curving of figure (2). And what is the connection between the quality of curving and the condition that something curves? The answer is that the condition that something curves is the existential generalization of the quality of curving. Likewise, the condition that (1) is triangular and (2) curves is the conjunction of the condition that (1) is triangular and the condition that (2) curves; and so on. Let us call the fundamental logical operations like these *condition-building operations*. With this terminology one may then say generally how conditions are related to qualities and connections. Conditions are built up by means of condition-building operations from qualities and connections,[10] i.e., from the properties and relations that provide the world with its logical, causal, and phenomenal order. Of course, since conditions conform to conception 1, there are any number of ways in which a given condition can be built up. Witness the identity of, e.g., the condition that (1) has three angles, the condition that (1) has three sides, the condition that (1) has three sides and $5 + 7 = 12$, and so on.

This completes my informal characterization of qualities, connections, and conditions. Let us now turn our attention to intentional matters and thinking.

41. Thoughts and Concepts

Ideas, Locke tells us, are '... *whatever it is which the mind can be employed about in thinking* ...' (p. 32, *An Essay Concerning Human Understanding*). He continues, '... there are such *ideas* in men's minds: every one is conscious of them in himself; and men's words and actions will satisfy him that they are in others.' Ideas divide naturally into two kinds, *thoughts* and *concepts*. Let us consider thoughts first. Just as conditions are the sort of things that are said to obtain or not, so thoughts are the sort of things that are said to be true or false. According to common sense, a thought is true if and only if it corresponds to a condition that obtains, and a thought is false if and only if it corresponds to a condition that does not obtain. For example, the thought that something is triangular is true just in case the corresponding condition that something is triangular obtains. And the thought that nothing is triangular is false just in case the corresponding condition that nothing is triangular does not obtain.

I come next to concepts. Just as qualities are said to qualify objects and connections are said to connect objects, concepts are said to apply to objects. For example, just as the quality triangular qualifies figure (1), the concept of being triangular applies to figure (1). There are, relatedly, concepts that correspond to qualities or connections. For example, the concept of being triangular corresponds to the quality of being triangular. If a concept corresponds to a quality, then the concept applies to an object if and only if the corresponding quality qualifies the object. Or if a concept corresponds to a connection, then the concept applies to certain objects (in a certain order) if and only if the corresponding connection connects those objects (in that order).[11]

Thoughts are the sort of thing that can be believed, disbelieved, remembered, forgotten, understood, misunderstood, asserted or denied in language, advanced as theories, etc. This is to say, thoughts are natural objects of intentional relations. Now given my investigation into the logic for intentional matters, it follows that these objects of intentional relations conform to conception 2. This makes thoughts quite a different type of thing from conditions. Consider a few examples involving the little triangular figure (1) discussed earlier. Even though the condition that (1) is triangular is the same condition as the condition that (1) is trilateral, the thought that (1) is triangular is, intuitively, quite distinct from the thought that (1) is trilateral. And of course, even though the condition that (1) is triangular is the same condition as the condition that (1) is triangular and $5 + 7 = 12$, the thought that (1) is triangular is quite distinct from the thought that (1) is triangular and $5 + 7 = 12$. And so on. Similar considerations show that concepts too are conception 2 intensions. Therefore, thoughts, since they can be said to be true or false, are 0-ary conception 2 intensions, and concepts, since they can be said to apply to objects, are n-ary conception 2 intensions, $n \geq 1$.[12]

But there is a lacuna in this story: where do the Cambridge properties and relations fit in? Consider the Cambridge property grue. Since grue is not a phenomenal property, we cannot experience it. And since it has no causal efficacy, it can leave no causal traces in the world. Nor is it a fundamental logical property. Indeed, our only knowledge of grue comes via the original definition: x is grue iff_{df} x is green if examined before t and blue otherwise. However, by the conclusion arrived at near the close of §38, complex expressions in natural language express the kind of intensions that have to do with intentionality and thinking. That is, they express thoughts and concepts. Therefore, the complex expression 'green if examined before t and blue otherwise' expresses a concept. What could grue be if it is not this concept? True, there is one alternative; someone might think that grue is one of the conception 1 properties posited in the theory T1. To be sure, T1 does posit such a property since T1-property formation is closed under all combinations of the logical operations, even *ad hoc* ones. But the fact that T1 posits such properties does not decide the question of whether they really exist. For T1 is only a provisional theory which was constructed at a precritical, experimental stage, and the relevant closure property was built in to simplify the construction rather than to capture a philosophically motivated picture of intensional entities. Thus, T1 cannot be used to settle the present basic philosophical issue. And once one sets aside T1 as an authority, one sees that the most natural and economical picture is that in which grue is simply identified with the concept expressed in the original definition. What good reason could there conceivably be for identifying grue with anything but this concept? I conclude, therefore, that grue is a mere concept. And generalizing on this, I conclude that all Cambridge properties and relations are nothing but concepts. That is, all properties that are not qualities and all relations that are not connections are concepts. After all, these properties and relations play no role in determining the logical, causal, or phenomenal order in the world. Their primary role is in thinking, and that role is often only playful. Indeed, grue was a concept introduced with no other purpose than the posing of a riddle.

I thus arrive at a natural and economical picture. Qualities, connections, and conditions are the intensional entities that pertain to the world. Thoughts and concepts are those that pertain to thinking. And qualities, connections, conditions, thoughts, and concepts are all the intensional entities there are.

The next question to consider is how these intensional entities are related to one another. Recall the little curving figure (2) discussed earlier. What is the connection between the quality of curving, figure (2), and the thought that (2) curves? Just as the condition that (2) curves is a result of predicating curving of (2), so too the thought that (2) curves is a result of predicating curving of (2). But the thought that (2) curves is quite distinct from the corresponding condition that (2) curves. It follows that two different types of predication must be at work here: one combines the quality of curving and figure (2) to yield the thought that (2) curves, and the other combines the quality of curving and figure (2) to yield the condition that (2) curves. Likewise for other cases. For example, just as the condition that something curves is a result of existentially generalizing on the quality of curving, so too the thought that something curves is a result of existentially generalizing on this quality. Since this thought is quite distinct from the corresponding condition, two types of existential generalization must be at work. One operates on the quality of curving to yield the condition that something curves, and the other operates on this quality to yield the thought that something curves. In this way I isolate two distinct types of fundamental logical operations—*condition-building operations* and *thought-building operations*. This leads to the following picture. Thoughts and conditions are alike except that, whereas conditions are built up ultimately from qualities and connections by means of condition-building operations, thoughts are built up ultimately from qualities and connections by means of thought-building operations. Of course, since conditions conform to conception 1, they can be built up in any number of ways; since thoughts conform to conception 2, they are built up in a unique, non-circular way.

Notice, however, that concepts can themselves be combined together to obtain thoughts. This suggests extending the above picture to allow that concepts also are built up ultimately from qualities and connections by means of the thought-building operations. Or to put the point the other way around, concepts can be analysed ultimately into qualities and connections by means of the inverses of the thought-building operations. A consequence of this picture is that there are certain concepts that, as limiting cases, cannot be analysed any further by means of the inverses of the thought-building operations. These concepts I will call *simple concepts* or, following Locke, *simple ideas*. All other ideas, whether they be thoughts or concepts, I will call *complex*. Since simple concepts cannot be analysed any further, according to the above picture they must be just qualities or connections. For example, the concept of green is just the quality green; the concept of predication is just the connection predication; etc. In turn, since simple concepts are qualities and connections, they must conform to conception 1. That is, simple concepts are identical if and only if they are necessarily equivalent. Complex ideas are not like this; they can differ even if they are necessarily equivalent.

This metaphysical picture of the constitution of thoughts and concepts is really just the outcome of conclusions reached earlier in the book. At the close of §38 I argued that sentences in natural language express thoughts. However, we know that many sentences in natural language are used to express theories and phenomenal descriptions. Therefore, theories and phenomenal descriptions are simply kinds of thoughts. Given the special roles that qualities and connections play in theories and phenomenal descriptions, it follows that genuine qualities and connections (plus perhaps subjects of singular predications) must be the ultimate building blocks of all true theoretical and phenomenal thoughts. Moreover, an analogous argument shows that genuine qualities and connections (plus perhaps subjects of singular predications) must be the ultimate building blocks of all the concepts that go to make up true theoretical and phenomenal thoughts. The metaphysical picture sketched above is nothing but the generalization on these conclusions: qualities and connections (plus subjects of singular predications) are the ultimate building blocks of all thoughts and concepts. In view of the unique foundational role that theoretical and phenomenal concepts have in all other thoughts and concepts, this generalization is compelling.[13]

I have been unable to find any counterexamples to the above theory, and I have some grounds for believing that none will be forthcoming. Any purported counterexample that someone produces must be a thought or concept to which he has some kind of epistemic access. Specifically, he must know of the thought or concept either innately or by experience or by description—such as causal "reference-fixing" description—or by definition, using the fundamental condition-building and thought-building operations. However, the metaphysical theory sketched in this chapter is designed to account for all intensional entities to which we have these kinds of epistemic access, and thus, counterexamples should not be forthcoming.

42. Realism and Representationalism

The foregoing theory that the primary bearers of truth (i.e., thoughts) are built up ultimately from the primary constituents of reality is by no means novel. It harks back to views held by Plato and Aristotle. According to Plato, those things that can be said to be true or false 'owe their existence to the weaving together of forms' (*Sophist* 260E). Likewise, according to Aristotle, 'Nothing, in fact, that is said without combination [literally, without interweaving] is either true or false' (*Categories* 13b11), and the primary constituents of reality, i.e., the items in primary metaphysical categories, are those 'things said without any combination', i.e., literally, those things said without any interweaving (*Categories* 1b25). This similarity is not superficial. Recall that Plato and Aristotle are usually identified as the originators of the correspondence theory of truth. But what is the relation of *correspondence*? Given the above theory of the constitution of thoughts and concepts, the correspondence relation can be given a precise logical analysis, an analysis that is plainly implicit in this metaphor of interweaving invoked by Plato and Aristotle.

I will take a moment now to show how this analysis of the correspondence relation will go. The goal is to say what it is for a thought to correspond to a condition and what it is for a concept to correspond to a quality or a connection. Consider once again the little curving figure (2) discussed earlier. Why does the thought that (2) curves correspond to the condition that (2) curves? The answer is that the thought that (2) curves and the condition that (2) curves are formed ("woven together") in the same way from the same basic things, the only difference being that the thought is formed by means of the thought-building operation of predication whereas the condition is formed by means of the condition-building operation of predication. The thought that (2) curves is true because the condition to which it bears this structural isomorphism is a condition that obtains. For another example consider the shape of the little figure (1) which I discussed earlier. To this quality there correspond any number of necessarily equivalent concepts, e.g., the concept of being triangular, the concept of being trilateral, the concept of being a closed figure whose angles sum to two right angles, the concept of being triangular and such that $5 + 7 = 12$, etc. These concepts all correspond to the single quality triangular. But why? When these concepts are analysed by means of the inverses of the thought-building operations and then formed again, this time by means of the condition-building operations, the result is just the shape of (1), i.e., the quality triangular itself. Thus, in general, the relation of correspondence that holds between an idea and a quality, connection, or condition is the relation holding between entities that are composed in the same way from the same ultimate constituents, the only difference being that the one is composed by means of the fundamental logical operations typically used for composing thoughts whereas the other is composed by means of the fundamental logical operations typically used for composing conditions. It is in this structural isomorphism that we find a purely logical analysis of the relation of correspondence.

Before showing how to make this analysis fully precise and rigorous, I want to take up the general philosophical question of how an idea is fundamentally related to a counterpart in the world. One can discern two opposing trends in the history of philosophy concerning this question, one that may be called *realism* and the other, *representationalism*. Take any complex idea that corresponds to a quality, connection, or condition. Since the idea is never identical to the thing to which it corresponds, there is a sense in which it can be said to represent. This is not what I mean by representationalism. For me, representationalism is the much stronger doctrine that, even when an idea is fully analysed, neither qualities nor connections nor items belonging to other primary metaphysical categories (such as particulars, stuffs, etc.) ever enter in. A consequence of representationalism is that there is no way to escape representation; at most, thoughts and concepts give way to other thoughts and concepts, *ad infinitum*. The effect of this is to render the link between ideas and the world some kind of mysterious unanalysable relation. Realism, on the other hand, is the doctrine that, if an idea is fully analysed, then qualities, connections, and perhaps items from other primary metaphysical categories do enter in. So according to realism, representation always comes to a halt at some stage; sooner or later one gets to the real things in the world, to the primary constituents of reality. In this way realism opens up the possibility of giving a non-circular analysis of how ideas are linked to the things in the world to which they correspond. The theory that I have described, for example, is realistic since all ideas can be analysed ultimately into qualities and connections and perhaps subjects of singular predication.

The history of philosophy is laced with conflicting representationalist and realist threads. In fact, there is often evidence of both doctrines in the work of a single philosopher. Nevertheless, as I have already intimated, one may venture to classify Plato and Aristotle as realists. And in contrast, one may venture to classify as representationalists nearly all of the classical modern philosophers from Descartes and Locke through Kant. Further, in classical modern logical philosophy one may classify Russell as a realist and Frege as a representationalist.[14] In contemporary philosophy in the English-speaking world there are currents of neo-Russellian realism; nonetheless, representationalism still exercises remarkable influence.[15] And in continental European philosophy the tradition of representationalism has been all but continuous from Descartes to Derrida.

Yet despite its long history, representationalism is an inherently defective doctrine. The reason for this could scarcely be more dramatic: representationalism inevitably veils its own subject matter—thought and language—in mystery and metaphor. So if realism can as much as be made acceptable, it must be counted as superior to representationalism. I submit, however, that the realism that I have set forth is perfectly acceptable. The only remaining task is to show that it can be given a coherent formal statement, and this will be done in the next section. My conclusion is that there is just no good reason to remain under the spell of representationalism.

In closing I should like to add that the virtue of realism is not limited to its ability to clear up the intellectual mist produced by representationalism. Realism also leads to promising solutions to some of the most central outstanding problems in classical modern philosophy, problems that have resisted solution for so long largely because they have been thought of in representationalist terms. These problems and their realistic solutions will be the final concern of the work.

43. The Logic for Qualities and Concepts*

The version of realism I am advocating is a synthesis of the two traditional conceptions of intensional entities. To adopt it, I must make certain revisions in the two provisional theories that I have been working with in the preceding chapters. These revisions are concerned for the most part with the theory for conception 1.

* Readers seeking only an overview may proceed to the next chapter.

On the suggested version of realism, there are two types of intensional entities: qualities, connections, and conditions, on the one hand, and thoughts and complex concepts, on the other. Qualities, connections, and conditions conform to conception 1 while thoughts and complex concepts conform to conception 2. Since these are the only intensional entities, properties and relations fall into two kinds: those that are genuine qualities and connections and those that are mere complex concepts. The latter are the Cambridge properties and relations. The Cambridge property grue, for example, is a complex concept and so is a conception 2 entity. On the provisional theory for conception 1, however, no matter how conception 1 entities are combined together by means of the fundamental condition-building operations, the result is always treated as another conception 1 entity. Thus, on that provisional theory, grue would be counted as a conception 1 entity; that is, it would be counted as a quality, not as a complex concept. To eliminate this conflict, I must modify the characterization of the condition-building operations presented in the provisional theory.

Consider some simple examples to see how this modified characterization should go. Take the condition-building operation of negation. As in the provisional theory, this operation should still take, e.g., the condition that something is green to the condition that nothing is green. But now this operation should take the quality green to the concept not-green. The reason for this is that there is no quality not-green, and therefore, the property not-green must be a concept, namely, the concept not-green. At the same time, the condition-building operation of negation should take this property not-green back to the quality green. The reason is that the property not-not-green is necessarily equivalent to the quality green, and therefore, this property must be a quality, namely, the quality green. In general, the condition-building operations must accord with the following principle: if a property, relation, or condition is necessarily equivalent to a quality, connection, or condition, then it is identical to that quality, connection, or condition; otherwise it is just an appropriate concept.

In §41 I divided ideas into two kinds—thoughts and concepts. A complex idea was defined as an idea that can be analysed by means of the inverses of the thought-building operations; a simple idea, as one that cannot. This made every simple idea either a quality or a connection. In what follows, however, I will simplify things by also permitting conditions to be simple ideas. In consequence, every intensional entity will be called an idea.

With the foregoing in mind, I will now construct a new type of model structure, one designed to model the behavior of qualities, connections, conditions, thoughts, and concepts. Thus, I define a *type 3 model structure* $\mathscr{M}$ to be any structure

$$\langle \mathscr{D}, \mathscr{P}, \mathscr{K}, \mathscr{G}, \mathrm{Id}, \\ \mathrm{Conj^c}, \mathrm{Neg^c}, \mathrm{Exist^c}, \mathrm{Exp^c}, \mathrm{Inv^c}, \mathrm{Conv^c}, \mathrm{Ref^c}, \mathrm{Pred^c_0}, \mathrm{Pred^c_1}, \ldots, \\ \mathrm{Conj^t}, \mathrm{Neg^t}, \mathrm{Exist^t}, \mathrm{Exp^t}, \mathrm{Inv^t}, \mathrm{Conv^t}, \mathrm{Ref^t}, \mathrm{Pred^t_0}, \mathrm{Pred^t_1}, \ldots \rangle$$

that satisfies the following three requirements. Let the diminished structure

$$\langle \mathscr{D}, \mathscr{P}, \mathscr{K}, \mathscr{G}, \mathrm{Id}, \mathrm{Conj^c}, \mathrm{Neg^c}, \mathrm{Exist^c}, \mathrm{Exp^c}, \\ \mathrm{Inv^c}, \mathrm{Conv^c}, \mathrm{Ref^c}, \mathrm{Pred^c_0}, \mathrm{Pred^c_1}, \ldots \rangle$$

be called $\mathscr{M}_1$, and let the diminished structure

$$\langle \mathscr{D}, \mathscr{P}, \mathscr{K}, \mathscr{G}, \mathrm{Id}, \mathrm{Conj^t}, \mathrm{Neg^t}, \mathrm{Exist^t}, \mathrm{Exp^t}, \\ \mathrm{Inv^t}, \mathrm{Conv^t}, \mathrm{Ref^t}, \mathrm{Pred^t_0}, \mathrm{Pred^t_1}, \ldots \rangle$$

be called $\mathscr{M}_2$. The first requirement on $\mathscr{M}$ is simply that the diminished structures $\mathscr{M}_1$ and $\mathscr{M}_2$ are standard algebraic model structures. Before I give the second requirement I will give some definitions. Let the operations $\mathrm{Conj^c}, \ldots$ be called condition-building operations, and let $\mathrm{Conj^t}, \ldots$ be called thought-building operations. Things in a subdomain $\mathscr{D}_i$, for $i \geq 0$, are called ideas. Things in a $\mathscr{D}_i$, for $i \geq 1$, are called concepts. Ideas that are in the range of some thought-building operation are called complex. And ideas that are not complex are called simple. Complex ideas in $\mathscr{D}_0$ are called thoughts. Simple ideas in $\mathscr{D}_1$ are called qualities. And simple ideas in a $\mathscr{D}_i$, for $i \geq 2$, are called connections. Things in $\mathscr{D}_0$ that are in the range of some condition-building operation are called conditions. Things in $\mathscr{D}_1$ that are in the range of a condition-building operation are called properties. Things in a $\mathscr{D}_i$, for $i \geq 2$, that are in the range of some condition-building operation are called relations. Properties and relations that are complex ideas are called Cambridge properties and relations. Now for the second requirement on $\mathscr{M}$. This requirement concerns the type that the algebraic model structures $\mathscr{M}_1$ and $\mathscr{M}_2$ must be. $\mathscr{M}_2$ is type 2. $\mathscr{M}_1$ however is mixed. In the case of qualities, connections, and conditions, $\mathscr{M}_1$ behaves like a type 1 model structure, but when it comes to Cambridge properties and relations, $\mathscr{M}_1$ behaves like a type 2 model structure. Specifically, if x is a quality, connection, or condition, then for any property, relation, or condition y, x and y satisfy the following: $(\forall H \in \mathscr{H})(H(x) = H(y)) \supset x = y$. On the other hand, if a property or relation $\mathrm{Conj}^{c}(u, v)$ is a Cambridge property or relation, then it is identical to the complex concept $\mathrm{Conj}^{t}(u, v)$; if a property or relation $\mathrm{Neg}^{c}(u)$ is a Cambridge property or relation, then it is identical to the complex concept $\mathrm{Neg}^{t}(u)$; and so on *mutatis mutandis* for each of the other condition-building operations. Before I give the third requirement on $\mathscr{M}$, I will give one more definition. Take any element of $\mathscr{D}$ that is built up from elements of $\mathscr{D}$ by means of the condition-building and thought-building operations. Consider the tree associated with this building-up procedure. If in this tree a given node branches into the three nodes $\langle \mathrm{Pred}^{c}_{k}, v, w\rangle$ or $\langle \mathrm{Pred}^{t}_{k}, v, w\rangle$, then the node w will be called a *subject node*. The third requirement on $\mathscr{M}$ concerns the constitution of simple and complex ideas. First, every condition is a simple idea. Secondly, every simple idea has an associated tree (infinitely many, in fact) in which every terminal node is either a condition-building operation, a quality, a connection, or a subject node. (Such a tree will be called a *condition-building tree*.) In turn, every complex idea has an associated tree in which every terminal node is either a thought-building operation, a simple idea, or a subject node.[16] (Such a tree will be called a *thought-building tree*. For convenience I will also say that a simple idea is as a limiting case a one-node condition-building tree for itself and a one-node thought-building tree for itself.)

With type 3 model structures defined I can now go on to develop the logic for qualities and concepts. The strategy will be to proceed in stages akin to those encountered over the previous chapters. Thus, I begin by constructing an intensional language $\mathscr{L}_\omega$ appropriate to the logic for qualities and concepts. In its primitive symbols $\mathscr{L}_\omega$ is just like L_ω except that it contains an additional punctuation mark $|$. The terms and formulas of $\mathscr{L}_\omega$ are inductively defined as follows:

(1) All variables are terms.
(2) If $t_1, \ldots, t_j$ are terms, $F^j_i(t_1, \ldots, t_j)$ is a formula.
(3) If A and B are formulas and v_k is a variable, then $(A \,\&\, B)$, $\neg A$, and $(\exists v_k)A$ are formulas.

(4) If A is a formula and $v_1, \ldots, v_m$ are distinct variables, for $m \geq 0$, then $|A|_{v_1 \ldots v_m}$ and $[A]_{v_1 \ldots v_m}$ are terms.

The complex singular terms in $\mathscr{L}_\omega$ should be read as follows ($m \geq 2$ and $n \geq 1$): $|A|$, the condition that A; $|A|_{v_1}$, the property of things v_1 such that A; $|A|_{v_1 \ldots v_m}$, the relation among things $v_1, \ldots, v_m$ such that A; $[A]$, the thought that A; $[A]_{v_1 \ldots v_n}$, the concept of things $v_1, \ldots, v_n$ such that A.[17]

In constructing the semantics for $\mathscr{L}_\omega$ I will make use of the following heuristic principles. Qualities and connections are the only conception 1 properties and relations. All other properties and relations, since they are Cambridge properties and relations, are complex concepts. So, in particular, if there exists a quality of (or connection among) things α such that A, then that quality (connection) is identical to the property of (relation among) things α such that A. On the other hand, if there does not exist a quality of (connection among) things α such that A, then the property of (relation among) things α such that A is a Cambridge property (relation) and, hence, is just identical to the concept of things α such that A. The relevant semantics for $\mathscr{L}_\omega$ may be constructed as follows.

The notions of interpretation, assignment, truth, and validity for $\mathscr{L}_\omega$ (relative of course to type 3 model structures) are defined exactly as they are in the §14 semantics for L_ω. When I come to the definition of the denotation function, however, a few alterations are in order. The denotation function $\mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}$ for $\mathscr{L}_\omega$ must be defined for all terms, including the two types of intensional abstracts $|A|_\alpha$ and $[A]_\alpha$. Accordingly, although the clauses for variables and elementary intensional abstracts $[F_i^j(v_1, \ldots, v_j)]_{v_1 \ldots v_j}$ are unchanged, the clauses for the non-elementary intensional abstracts $[A]_\alpha$ are modified in two ways. First, it must be made explicit that the fundamental logical operations are the thought-building operations $\mathrm{Conj}^{\mathrm{t}}, \ldots$. Secondly, the clause for predication$_k$, $k \geq 1$, now covers, not only k-ary relativized predications of the form $[F_i^j(t_1, \ldots, t_{h-1}, [B]_\gamma^\delta, t_{h+1}, \ldots, t_j)]_\alpha$, but also ones of the form $[F_i^j(t_1, \ldots, t_{h-1}, |B|_\gamma^\delta, t_{h+1}, \ldots, t_j)]_\alpha$. Finally, the following clause is added for the complex terms $|A|_\alpha$:

If relative to $\mathscr{M}$ there is a quality, connection, or condition x in the same subdomain as $\mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}([A]_\alpha)$ and if $(\forall H \in \mathscr{K})(H(x) =$

$H(\mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}([A]_\alpha)))$, then $\mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}(|A|_\alpha) = x$; otherwise $\mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}(|A|_\alpha) = \mathrm{D}_{\mathscr{I}\mathscr{A}\mathscr{M}}([A]_\alpha)$.

Relative to this semantics, a logic T3 for $\mathscr{L}_\omega$ may be formulated, and I am optimistic that there is a positive solution to the completeness problem for it. In this connection, $\Box$ and $\Diamond$ may, as a notational convenience, be defined as follows:

$\Box A$ *iff*$_{\mathrm{df}}$ $|A| = ||A| = |A||$
$\Diamond A$ *iff*$_{\mathrm{df}}$ $\neg\Box\neg A$.

Thus, just as in T1, so also in T3, modal logic may be viewed as the identity theory for intensional abstracts.

Now recall the extensional analysis of intensional abstraction given in §37. There it was shown how to translate the intensional language L_ω into an extensional language L. By a fully analogous procedure, the intensional language $\mathscr{L}_\omega$ for the logic of qualities and concepts can be translated into an extensional language $\mathscr{L}$. Among the primitive logical constants of $\mathscr{L}$ are distinguished logical predicates in terms of which one can express the condition-building and thought-building operations. In $\mathscr{L}$, therefore, one can define the concepts of quality, connection, condition, simple and complex idea, thought, concept, Cambridge property, and Cambridge relation.

Finally, at any stage in the study of the logic for qualities and connections, Δ may be singled out as a distinguished logical predicate for the predication relation, and appropriate axioms for it may be introduced.

44. Correspondence

Earlier I gave an informal statement of a purely logical definition of the correspondence relation. According to the definition an idea x corresponds to a quality, connection, or condition y if and only if x and y can be composed from the same entities in the same way, the only difference being that x is composed by means of the thought-building operations whereas y is composed by means of the condition-building operations. Thus, correspondence turns out to be a structural relation, specifically, a structural isomorphism. In this, correspondence is not a mysterious, unanalysable relation of ideas "mirroring" the world. For that matter, the definition allows us to say precisely what it is about certain ideas that prompts us to say that they "mirror" the world. I will have more to say about this in a moment. First, let me show what the analysis looks like formally.

I will begin by giving a model-theoretic presentation. Consider any type 3 model structure $\mathcal{M}$. Relative to $\mathcal{M}$, a thought-building tree t is defined to be *isomorphic* to a condition-building tree t' if and only if t and t' are exactly alike in all their terminal nodes except that, when a condition-building operation occurs as an operation (not as an argument) at some terminal node in t', the equivalent thought-building operation occurs in its place at that node in t.[18] Then the correspondence relation on $\mathscr{D}$ relative to $\mathcal{M}$ is defined as follows: an idea $x \in \mathscr{D}$ *corresponds* to a quality, connection, or condition $y \in \mathscr{D}$ if and only if x has a thought-building tree that is isomorphic to a condition-building tree of y.[19] (Of course, since y is a conception 1 entity, it has infinitely many condition-building trees.)

This definition of the correspondence relation for $\mathcal{M}$ is justified by the following theorem:

> *Theorem:* Let $\mathcal{M}$ be any type 3 model structure. Then for all ideas x and all qualities, connections, and conditions y in the domain of $\mathcal{M}$, x corresponds to y if and only if x and y belong to the same subdomain and x and y are necessarily equivalent in $\mathcal{M}$ (i.e., $x, y \in \mathscr{D}_i$, for some $i \geq 0$, and $(\forall H \in \mathscr{K})H(x) = H(y)$).

(The proof is a straightforward inductive argument.) It is now clear why the correspondence relation is entitled to play such an important role in linking ideas to the world. Correspondence is a relation holding between ideas and necessarily equivalent qualities, connections, and conditions.

But I have still not defined the correspondence relation itself. I have only defined a relation on elements of the domain of arbitrary type 3 model structures $\mathcal{M}$. Yet since this is only a construction in model theory, these elements could be any arbitrary objects whatsoever; they need not even be intensional entities. The next step, therefore, is to define the correspondence relation proper. To do this, I will use the canonical language $\mathscr{L}$ for the logic of qualities and concepts, where this language is interpreted in the intended way. After all, at some stage it is appropriate to kick away the metatheoretical study aids and to take one's logical theory at face value. That is, at some stage it is appropriate to stop mentioning the language of one's logical theory and instead to begin using it. Now is the time.

Recall that in $\mathscr{L}$ one can express the thought-building and condition-building operations. Thus, on analogy with the model-theoretic definition one can in $\mathscr{L}$ give an inductive definition of the correspondence relation. I.e., one can give an inductive definition of the relation holding between ideas x and qualities, connections, and conditions y such that x has a thought-building tree that is isomorphic to one of the condition-building trees of y. The next step is to single out in $\mathscr{L}$ the distinguished logical predicate Δ for the predication relation. Then, given a Zermelo-style theory for Δ, one can turn the inductive definition of the correspondence relation into a direct definition. This is so since the relevant thought-building and condition-building trees have only a finite number of nodes. Thus, using the canonical language $\mathscr{L}$, one obtains a purely logical direct definition of the correspondence relation.

According to the definition, correspondence is a structural relation. Specifically, it is structural isomorphism definable within pure logic in terms of the predication relation and the fundamental operations by means of which thoughts and conditions are composed. Given the logical behavior of these fundamental logical relations, the structural isomorphism insures that if an idea corresponds to a quality, connection, or condition, then they are necessarily equivalent.

Correspondence is thus not a mysterious, unanalysable extra-logical relation of ideas "mirroring" the world. In fact, one can finally say precisely what it is about certain ideas that makes us want to say that they "mirror" the world. An idea "mirrors" a quality, connection, or condition in the world if and only if the two can be composed in exactly the same way from exactly the same things except that in the case of the idea the thought-building operations assume the role played by the condition-building operations. In this fashion the analysis of the correspondence relation preserves—and indeed makes good logical sense of—the metaphor that ideas "mirror" the world. In fact, the analysis does this with a flourish. Recall that qualities, connections, and conditions conform to conception 1, and ideas conform to conception 2. This shows that there exist infinitely many distinct yet perfectly faithful "mirrors" of any single quality, connection, or condition in the world.