Chapter 12: Occurrents
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In this chapter, we distinguish occurrents from entities of other sorts. Then, within the class of occurrents, we introduce several other distinctions that will yield a taxonomy of temporal entities. We distinguish temporally extended from instantaneous occurrents, and a further distinction is drawn between processes which have an internal temporal structure, and other temporally extended occurrents which are internally unstructured. It turns out, however, that such distinctions only apply directly to types of occurrents, and only indirectly to their particular tokens or instances. Therefore, we have to consider the way in which types of occurrents are related to their instances. It will become apparent that individual occurrents may instantiate more than one type simultaneously, where the types involved are systematically related to one another.

1. Some Things that are not Temporal

At first glance, it may seem that everything that exists is also temporal in some sense. Therefore, it may not make much sense to distinguish temporal from non-temporal entities. However, there are at least three types of things that may be said not to be temporal in a strict sense.

First, there are things that are prior to all temporality in the sense that they are more fundamental than everything that is temporal. For instance, if something is temporal by virtue of being or occurring in time, then time itself is either not temporal or it occurs immediately in itself. Since it is hard to make sense of the latter, time itself does not appear to be temporal. It is, rather, prior to all temporality. Accordingly, time is not an occurrent.

A second class of things that are not temporal in a stricter sense consists of abstract entities, including numbers, geometrical shapes, and universals, such as the types under which concrete temporal and non-temporal things fall. These entities are also not the immediate topic of the present chapter. Types of temporal entities, however, will play a role later in this chapter, and therefore it will be good to briefly clarify the status of such types.

A type is something with respect to which concrete things may be called either typical or atypical.\footnote{\textsuperscript{52} Compare the use of the term ‘type’ by C. S. Peirce, who introduced the type / token distinction into philosophy. Peirce also calls types ‘legisigns’ and thereby indicates} Types are specified by characterizing their
typical instances. For example, in order to specify the type ‘beaver’, one will have to mention the characteristic features of the instances of this type. For instance, beavers have 20 teeth. This does not mean that all or even most beavers have these features, since it may well be the case that all existing instances of a type happen to be deformed, unhealthy, or atypical in some other sense. They might all have lost one tooth. Further, a type may be realized by several different subgroups of still typical instances: for example, there are male and female exemplars of the type ‘beaver’, and there are at least three rather different ways of being a typical ant.

In the present context, we will only deal with types of temporal entities, such as the type ‘gastroscopy’. A concrete gastroscopy – the examining of the inside of patient Chen’s stomach with an endoscope – is what it is in virtue of instantiating this type. As its instance, a concrete gastroscopy is subject to certain rules that determine its typical and proper form. These rules do not only apply to one particular gastroscopy, but they describe its more general type, which may be instantiated by any number of instances. They state how gastroscopies are to be performed in general. When a doctor explains to a patient what will happen during the course of an impending gastroscopy, he is specifying these rules. By looking at the rules, one may determine what belongs to a typical gastroscopy and what does not; but this does not mean that every proper instance of the type ‘gastroscopy’ must be a typical one. Particular gastroscopies may violate the laws of typicality that apply to their type, without ceasing to be what they are. Although the type ‘gastroscopy’ is a type of something that occurs in time, it is not itself something that occurs at any time. What occurs is in each case one of its concrete instances. Thus, in this sense the type ‘gastroscopy’ is not temporal: it does not occur.

A third class of entities that are not strictly temporal consists of continuants, that is, concrete things and their properties. Things and their properties may change over the course of time, but they do not occur in time. The class of things and their properties will be taken to include concrete things, such as a particular endoscope, but also physicians, digestive systems and their parts, and such entities as the form of an endoscope, the license of a physician, the price of a medication, and the condition of a patient.

All of these things may change, which might incline one to say that they exist in time. But when continuants change, they also appear to persist that types are specified by stating laws according to which their instances are to be classified as typical or not (Peirce, 1998).
through time in a way in which occurrences do not. It is of course perfectly acceptable to say that an occurrence, such as a gastroscopy, *lasts* for ten minutes, but this is not the same as when a continuant persists for ten minutes. It is difficult to draw this distinction in a clear and meaningful way. One is inclined to say that when continuants change, they also must remain the same in a certain respect. For instance, if the patient did not at least remain a human being, we would not say that her condition has improved.\(^53\) On the other hand, one may also say of a particular gastroscopy that in some sense, it remains the same throughout its occurrence. Hence, remaining the same does not mark off continuants from occurrences. Since any more rigorous and detailed account of the distinction between continuants and occurrences would occupy too much space, we must here rely on an intuitive distinction. Continuants are things that may be said to come into being, perish, and persist throughout a period of time; as opposed to occurrences which may be said to start, end, and last for a certain time.

In this chapter, our concern is with entities that do not belong to any of the three categories just outlined. We will not discuss time itself, nor will we be concerned with abstract entities, types, or universals as such, nor will we consider such things as an endoscope, a patient, her condition, or a license. The entities that will be discussed here are entities such as the improvement of someone’s condition, the performance of a gastroscopy, the loss of a license. These are entities that one may call temporal in a stricter sense: they happen or occur in, or over the course of, time. We will call them *occurrences*. The first question to ask is: How many general kinds of occurrences are there? In developing an answer to this question, we will gain a clearer insight into the features that distinguish occurrences from other kinds of entities. Occurrences may happen or occur at a certain time. An endoscope does not happen or occur, but its *use* or *modification* does.

2. Things that may Occur

2.1. Instantaneous vs. Extended Occurrences

A first distinction that may be drawn within the class of occurrences is that between *instantaneous* and *temporally extended* occurrences. Instantaneous

\(^{53}\) In general, if something were to change in all possible respects, there would be nothing which would be the subject of change. See Aristotle, *Physics* I 7; Kant, 1781, B 225ff.
occurrents happen, or occur; but they do not stretch over a time interval. For instance, the very end of a gastroscopy, in distinction to its concluding phase, is not temporally extended. As the end of an occurrent, it occurs instantaneously. It may well be that every instantaneous occurrent is necessarily a part of a temporally extended occurrent, such as the beginning, middle, end, beginning of its last third, etc. Non-extended, instantaneous occurrents will then be nothing but the boundaries of extended occurrents.\textsuperscript{54} This would indicate that temporally extended occurrents, which we mainly discuss in the following, are ontologically more fundamental.

2.2. Occurrents with a Generic Structure

Temporally extended occurrents are occurrents that take their course over a stretch of time. Such occurrents unfold in time; they may be said to consist in a sequence of stages, including at least a beginning and an end. Hence, one may be inclined to distinguish extended occurrents that typically take a specific course from others whose course is entirely undetermined. But are there occurrents whose structure is entirely undetermined? If this were so, we would in any case have no general names under which they would fall, since every name would associate the occurrents to which it applies with a specific type. We have already argued that every instance of a type is subject to certain standards of typicality. Hence, for all temporally extended occurrents that instantiate a type, there will be certain rules of typicality that govern their general structure.

One may object, first, that it is perfectly possible that something that happens here and now does not have any discernible structure. Hence, it would seem that there are occurrents that do not follow any specific course and to which no standards of typicality apply. But once we begin to spell out what it is that happens in this supposedly entirely unstructured way, we thereby, also, begin to determine its structure. In fact, it is already enough to call the item in question something which is occurring presently, since this already has implications regarding its structure. Any present occurrent must not yet be over; and in order to know whether an occurrent is over or not, we need to know under what conditions it would be over. In order to know this, however, we need to know the general type and structure of the occurrent in question.

\textsuperscript{54} See Aristotle, Physics VI 3.
Second, it could be argued that there is a most general type of occurrent, namely the type ‘occurrent’, which we may apply to something without implying any details about its more specific structure. Hence, it seems that we may indeed refer to entirely unstructured temporally extended occurrents. This however is not true, since everything that instantiates this most general type ‘occurrent’ also necessarily instantiates a more specific type. Again, since extended occurrents are items that have a beginning and an end in time, there must be some more specific subtype for everything falling under the most general type ‘occurrent’, which at least determines the specific conditions under which this kind of occurrent may be said to have begun or have ended. When we refer to something as an occurrent without characterizing its structure, we have nonetheless implicitly claimed that it has some such structure.

Third, it could be argued, for instance, that the persistence of a certain unchanging condition need not take any structured course. As long as the condition persists, no change occurs, and nothing specific happens. Now what we have here will nonetheless be an occurrent. Hence, it will be an occurrent that takes no specific course. But even in such cases, there must be at least two things we know about it: we must be able to tell under what conditions such an occurrent begins and under what conditions it ends, and this is already enough of a typical structure.

There are some occurrents, called *energeiai* by Aristotle, which are special in that they may already be complete while they are still occurring. For instance, when someone knows or sees something, he may also have known and seen it before. It would be wrong to say that he ‘is knowing it’, as if one could be engaged in an activity called knowing for some time and later be done with it. Put differently, in contrast to a gastroscopy, knowing something is not directed at a point when it will be both complete and over. Rather, to know something is already to have reached the relevant state of completion. We should distinguish between the *completion* of an occurrent and its *end* or *being over*. In the case of *energeiai*, the conditions under which they are complete differ from the conditions under which they are over. All other occurrents are also over when they are complete. Nonetheless, to know something is not a state (which is a continuant) but something that we do: it is an occurrent. Hence, there seem to be occurrents that take no specific course, since they are already complete when they occur.

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But in any case, *energeiai* are also not entirely unstructured. Insofar as knowing, for instance, occurs during a certain time, this occurrence will also have a general structure. It must at least be determined under what conditions the possession of this knowledge may be said to take place, so that we may judge what it takes for someone to come to know and to cease to know. *Energeiai* such as knowing differ from other occurrences only in that (1) during their occurrence, the only further development they may take is to end, and that (2) this end can hardly be called their completion. (To cease to know is not to complete one’s knowing.) All this means that we cannot assert that there must be occurrences without any general structure. The opposite is the case: every occurrence is an instance of some specific type.

### 2.3. Internally Structured Occurrences

The specific structure of an occurrence need not be known in detail; on the contrary, much may remain unspecified. The structure of an occurrence is already determined as soon as there are some criteria according to which it may be identified as an instance of its type. For that to be the case, we do not need to know many details.

There are, roughly, two degrees to which an occurrence may be structured. First, it may only be determined under which circumstances occurrences of its type begin and end. For instance, when someone looks for a pen, it is determined when this occurrence is complete and over, but it is not determined how long it will take and what steps, in which order, will be required. Looking for a pen has no *internal temporal structure*. If an occurrence does not have an internal temporal structure, there is no way to determine to what extent it is complete as long as it is still occurring. Before looking for a pen is over, it is not in general possible to tell how long it will take or how much of it has been done. This is also true of the persistence of an unchanging condition.

Second, there are occurrences with an internal structure. A gastroscopy, for instance, has an internal structure, since one may roughly say, at every one of its stages, how much of it is already over and what remains to be done.

One might object that in some sense, of course, we may know about every concrete occurrence to what extent it is over. In order to determine that, it seems, we only need to measure how long the complete occurrence takes and then calculate how much of this time is left. And since every
concrete occurrent must have a determinate duration, it will thus turn out that every concrete occurrent has an internal temporal structure.

But the distinction between occurrents with and without an internal temporal structure should be drawn more carefully. We want to say that an occurrent has an internal structure only if it is possible to determine how much of it has already occurred while it is still occurring. This holds true in the case of gastroscopies: we may determine, say, when half of it is done, even if we do not know how long the complete operation will take. That we are able to determine post hoc how much of an occurrent had occurred, after knowing how long the complete instance actually took, does not mean that it had an internal temporal structure in this sense. For this reason, we should rather speak of a typical internal temporal structure. We know how long gastroscopies typically take and what steps they typically involve, and only this enables us to tell how much of one of them is complete when it is still going on. By contrast, we cannot tell how long looking for a pen usually takes; we can therefore only say how long half of one of its instances would have been when it is over. That is, looking for a pen does not have a typical internal temporal structure.

Whether an occurrent is half over in this sense has nothing to do with its concrete, exact temporal duration. It may well be that the second half of a soccer match takes longer than the first, but we still call it a half. The typical internal structure of an occurrent is not measured in seconds, but consists in a more or less flexible sequence of steps. The distinction between occurrents with and without internal temporal structure is properly applicable only to types of occurrents. No particular occurrent has ever occurred that would not have had some particular internal structure. Conversely, one may say of any ongoing occurrent that its concrete internal structure is still undetermined: it is not yet established how this particular instance will in fact turn out to be structured. However, there is an interesting difference between gastroscopies and other occurrents such as looking for a pen, and this is the difference we want to point out here. Gastroscopies are of a type such that their structure is roughly determined before they are over, whereas looking for a pen is not of a type such that it would be even roughly determined in advance how long each instance takes. The rules that determine how to perform a gastroscopy also specify the typical internal temporal structure of a gastroscopy.
2.4. Telic and Atelic Occurrents

For all occurrents with a typical structure, whether internal or not, it is determined under what conditions they are complete or over. One may therefore want to call structured occurrents *telic*, since ‘telos’ means *end* in both of our two distinguished senses: the state of being complete, and the state of being over. Accordingly, one may wish to call those occurrents that have no structure *atelic*.\(^{56}\) However, this distinction is not of much use, since we have already shown that there are no entirely unstructured occurrents. Being an occurrent already implies structuredness.

Antony Galton (1984, 66) defines telic occurrents as occurrents that may be interrupted before they are over. However, as we shall presently see, every occurrent that occurs here and now is, by necessity, not yet over (because, when an occurrent is over, it is no longer occurring). Therefore, one may interrupt every occurrent before it is over. There are some occurrents that cannot be interrupted before they are *complete*, and perhaps this is what Galton means. In this case, the distinction he draws would coincide with the distinction between *energeiai* and other temporally extended occurrents. *Energeiai* are complete before they are over: they can be complete in that nothing belonging to them is undone, yet they can still be going on. For instance, someone can completely see, know, or enjoy something before she actually stops seeing, knowing, or enjoying it. Hence, *energeiai* may be interrupted before they are over, but perhaps not before they are complete. But this again is not a good reason for using the terms ‘telic’ and ‘atelic’, since these may as well be taken to refer to the completion of an event, and it would be misleading to say that *energeiai* are occurrents that are *atelic* in the sense of being incomplete or not allowing for a state of completion. Rather, *energeiai* are necessarily already complete whenever they occur.

Zeno Vendler distinguishes between *accomplishments* on the one hand, which may be interrupted before they are complete, and *activities* on the other hand, which may not (see Vendler, 1972). According to Vendler, running is an activity, whereas running a certain distance is an accomplishment, and reaching the end of this distance is an achievement. Activities, in this sense, have already been going on when they are going on: whenever I *am* running, I also have run immediately before. By

\(^{56}\) See Comrie, 1976, section 2.2.; also Dowty, 1991, section 2.2.
contrast, it is not the case that whenever I am running 10 meters, I also have run 10 meters immediately before.

Accordingly, moving the endoscope would be an activity, but carrying out a gastroscopy would be an accomplishment. But since, at certain times, gastroscopies consist in movements of endoscopes, this is not an ontological distinction between two kinds of occurrents, but only a distinction between different ways of referring to one and the same occurrent (see Gill, 1993). What the physician is doing when she is performing a gastroscopy may be regarded as something that is not yet over, namely a gastroscopy, or it may be regarded in abstraction from its outstanding end, namely as handling an endoscope. But the physician is not doing two things at once. The distinctions drawn by Galton and Vendler concern only different ways of referring to the same occurrent, and not even to different kinds of occurrents.

2.5. Completion vs. End

Moreover, one should not suppose that all occurrents with a generic structure are characterized, mainly, by having a certain result or even goal state. This also seems to be implied by calling them telic, but it is not true in most cases. It is true that the last step in a typical gastroscopy is the removal of the endoscope, and that the gastroscopy should normally also be completed by this step. This however does not mean that removing the endoscope is its goal: the removal of an endoscope alone is certainly not a gastroscopy, and its more important steps happen before this. Likewise, my reading a book is complete and over when I read the last page; but, of course, only when I have also read enough of the rest. In most cases, in order to specify what it takes for an occurrent to be complete, we need to mention more than its result state; we need to mention everything that typically belongs to the occurrent. Hence, the telos (completion) of an occurrent type always involves everything that belongs to the typical course that its instances take, not only the last step. Occurrents other than energeiai are over when they are complete, but not necessarily complete when they are over. As Anscombe says, ‘A man can be doing something which he nevertheless does not do’ (1957, §23). For instance, someone who is hit by a car while crossing a street was indeed crossing the street but did not in the end cross it. In the case of energeiai, the telos has nothing at all to do with the last step of the occurrent in question.
Some occurrents are indeed complete when and only when a certain result state is reached, and the telos of these occurrents may be justifiably identified with the state of the world that results from their occurrence. For instance, looking for a pen is complete if and only if the pen is found (or we give up the search), and it is irrelevant where and for how long the search was going on. When someone is looking for her glasses while wearing them, it is possible that no apparent searching behavior whatsoever is involved. In the present context, we call such occurrents telic that are complete when only their result state is reached. Such occurrents constitute an exception from the general rule, since the completion of most occurrents involves more than only reaching a result state.

2.6. Interim Statement

Let us briefly review the distinctions introduced so far. First, there are instantaneous occurrents and temporally extended ones. All temporally extended occurrents have a rudimentary typical structure since, for all of them, it must at least be clear under what conditions they begin and end. Some temporally extended occurrents do not possess any further internal temporal structure. These are, first, the ones that have been called telic at the end of last section: occurrents whose completion does not require more than the reaching of a certain end state. Second, those occurrents that Aristotle called energeiai also belong to this group. Since energeiai only occur as long as they are complete, and there is no further goal that they reach during their occurrence, they have no further internal structure. Besides these two kinds of occurrent without internal structure, there are occurrents that have a typical internal temporal structure. We will call these occurrents ‘processes’. The discussion so far yields the following taxonomy:

57 This term, ‘process’, is used in a variety of ways in the literature. Mourelatos (1978) defines processes as atelic occurrents; but he later withdraws this definition (1993). Stout (1997) identifies processes with types of occurrents, on which we will comment later. The Gene Ontology has used the term to designate complex, internally structured occurrents and calls simple extended occurrents ‘functions’ (Function Ontology Rules, Gene Ontology). Etymology would suggest that a process is something that involves a change, may be counted, and thus takes a typical course. What we call process in this paper has also been called kinesis by Aristotle, and by others achievement (Ryle, 1940, 130), performance (Kenny, 1963, Chapter 8), accomplishment (Vendler, 1972, Chapter 4), or development (Mourelatos, 1978).
2.7. Simple and Complex Occurrents

A further distinction remains to be discussed: that between simple and complex occurrents. Since instantaneous occurrents do not have temporal parts, one might think that they cannot be complex. Yet this is not correct. It may very well be essential to the success of a certain operation, for instance, that a physician performs two movements at once. The exact moment in which such a double movement succeeds will be an instantaneous occurrent that will nonetheless be complex, since it incorporates at least two occurrents of a different kind.

For the same reason, there may be complex temporally extended occurrents without an internal temporal structure. There may be occurrents, for instance, which typically have certain kinds of occurrents as components, but for which it may nonetheless be undetermined in what order they occur. Such occurrents have no temporal internal structure, since it will not be clear during their occurrence how much of them will already be over and how much remains to occur.

Are there, on the other hand, temporally extended occurrents which are simple? We have seen that all temporally extended occurrents incorporate at least two instantaneous occurrents: their beginning and their end. But this does not make them complex in the sense to which we appeal here. Here, ‘complex’ is applied to those temporally extended occurrents in which what happens between their beginning and the end, not counting the beginning and end themselves, is complex. That is, in a first approximation, we may call a temporally extended occurrent complex if it
can be broken down into further *temporally extended* occurrents, and simple if it cannot. But still, there is a sense in which every temporally extended occurrent may be divided into temporally extended parts, for every one of them can be split up into halves, thirds, etc. For this reason, it will be better to say that an extended occurrent is complex only if it can be divided into further temporally extended occurrents of *different, more specific types*. A uniform movement, for instance, can only be broken down into further uniform movements, and these are occurrents of the same type. It will accordingly count as simple. Also, waiting for an idea is a simple occurrent, since it is not known what is typically involved in this kind of occurrent other than lacking the idea, waiting for a while, and then (if you’re lucky) having it. Every extended part of it is also an instance of waiting and not of any more specific type. In contrast, a gastroscopy will count as complex because it may be divided into steps that instantiate different, more specific types.\

Thus, there are complex instantaneous occurrents, complex extended occurrents, and simple internally unstructured occurrents. But are there simple extended occurrents? A simple process should be composed of no further processes, but one should still be able to tell, as long as it is occurring, how much of it is complete. Dividing a complex process into its temporally extended parts will indeed yield such simple processes. Consider the movement that a physician makes when she inserts the endoscope into the esophagus. This movement is uniform; that is, all its extended parts are further movements of the very same type. Nonetheless, we may tell at each of its stages how much of it remains to be done, and therefore, what we have here is a simple, internally structured occurrent.

It follows that the distinction between simple and complex occurrents is independent of the other distinctions drawn so far, as the following Figure shows:

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58 Later we argue that, in some sense, the particular stages of a gastroscopy may be said to instantiate the type ‘gastroscopy’. Hence, we cannot say that the parts of a complex process do not instantiate the whole process. Rather, we call an occurrent complex if its stages, besides instantiating the whole occurrent type, also instantiate more specific types.
In the remainder of this chapter, we will focus on complex processes. Whereas all complex occurrences typically have several different parts, the parts of processes are also arranged in a typical order.

3. Types and Instances of Occurrents

We have appealed several times to the notion of types of occurrences. Types of occurrences differ from their instances in that they do not occur or happen. If something occurs, it is an instance, and if something is an instance of a type of occurrence, it occurs. There are several distinctions that are best drawn at the level of types. All particular instances of temporally extended occurrences take a determinate course in the sense that there are conditions for determining when they have begun and ended, and they all have an internal temporal structure. However, some occurrences have a typical internal temporal structure. When we specify the typical internal structure of an occurrence, we thereby characterize the type of which it is an instance. The typical course of a particular occurrence has the structure that it has by virtue of being an instance of a certain type. The type determines a structure insofar as there are standards according to which its instances may be judged to be typical or atypical, complete or incomplete. As we have already noted, it may be the case that a type is only instantiated by atypical or incomplete specimens. That a type of occurrence has a typical structure does not mean that its instances often or usually exhibit this structure.

3.1. Types of Occurrences are not Instantiated by Continuants

Types of occurrences are always instantiated by particular occurrences. This manner of speaking is not universally observed. It is sometimes said that types of occurrences are instantiated by the things which undergo, or participate in, such occurrences (see Rödl, 2005, 164). On this way of speaking, Socrates may be said to instantiate the type ‘going for a walk’ when he goes for a walk. This way of using the term ‘instantiates’ may have its origin in the fact that there can be no actual occurrence without there being something which undergoes, or participates in, this occurrence.59 Hence, whenever an occurrence occurs, there will also be a continuant which it involves. However, this does not mean that it is the continuant

59 With the possible exception of sounds; see Strawson, 1959, Chapter 2.
itself which instantiates the type of occurrent in question. Rather, types of occurrences are instantiated by individual *occurrents*, just as types of continuants are instantiated by individual continuants. Continuants participate in, or undergo, occurrences, but do not instantiate their types.

3.2. *How to Instantiate a Type of Occurrent*

Another way of confusing occurrences and continuants underlies a claim made by Rowland Stout to the effect that processes are really types of occurrences to which something happens when things undergo them (Stout, 1997). This is confused in several ways. First, what happens with the type when it is instantiated is, according to Stout, obviously itself an instance of a further type of occurrence. But this would mean that what happens between the continuant and the process must be a further process undergone by both of them, which in turn should be described as something to which something further happens. An infinite regress has blossomed. Second, as we saw earlier, types of occurrences are not temporal, even though their instances are: types are not instantiated in such a way that they occur in time. Entities which occur (occurrents) and entities which participate in this occurrence (continuants) are themselves never types but rather instances of types. Thus in order to understand what it takes to instantiate a type of occurrence, one needs to distinguish (at least) three sorts of beings: types of occurrences, their concrete instances, and the continuants which participate in these instances.

Continuants may undergo change, and when they do so, something happens. But this occurrent will not itself be something that changes. Granted, our language often permits us to say, e.g., that an activity becomes increasingly rewarding, or that it starts to become tedious. This however cannot mean that the activity in question would itself undergo a change. For, in this case, the change is really a change of the continuants which are participating in the activity (see Aristotle, *Physics* V, 2). That an activity is increasingly rewarding or tedious, for instance, simply means that the one who is engaging in it changes her attitude, or that the types of activities she is called upon to perform during one phase of an occurrent please her more or less than those types which she is called upon to perform during other phases.
4. Complex Processes and Their Parts

Processes are internally structured, temporally extended occurrents. Complex processes, by virtue of instantiating a certain type, have parts which are themselves extended occurrents, belong to different types, and occur in a certain typical order. For instance, knitting a wrist band is a complex process, since it may be broken down into temporally extended occurrents which are instances of different, more specific types. In order more precisely to distinguish complex from simple processes, we need to consider the way in which their types are specified. For this purpose it will be useful to consider two special cases of complex processes: intentional actions and speech acts.

4.1. Recipes for Actions

A simple and common way of specifying a type of complex action, such as knitting a wrist band or making an omelette, is to give a recipe. Recipes are structured to serve agents who possess certain basic capabilities and want to perform or at least initiate a complex process of a certain type. For this reason, a recipe will not explain every detail of what happens in the course of the process in question, but will only point out the sequence of steps that are basic relative to the normal agent; that is, the steps that a normal agent can immediately carry out without further instruction, preparation, or training. In this context, we may define a simple action as an action that need not be explained by a further recipe specifying its different components. For instance, it will be immediately clear what to do when told to move one’s own hand. One might of course divide any such hand movement into further components, but this does not render the action of moving one’s hand complex, since all its components are executions of the same basic capacity. If an agent knows how to move her hand from here to there, she will also know how to go on moving it. For this reason, the entire hand movement may be considered simple and not complex. Complex actions involve the actualization of different capacities at different times, and are specified by recipes; simple actions need not be specified by recipes, since they do not involve the actualization of multiple capacities (see Baier, 1972). Whether an action is simple or complex depends on the abilities of the agent. When we acquire basic abilities, such as speaking a language, it often happens that, through training, complex actions turn into simple actions. Initially, we may need detailed instructions
as to how to pronounce a certain word but, later, will be able to pronounce it without needing to reflect, step by step, upon these instructions.

What has been said about actions and recipes may be applied to processes in general. A process is simple if it does not involve further extended occurrences of different kinds. Thus, we may specify a recipe which includes all different simple processes that are typically involved in a complex process, and which determines their general order. This recipe will list the elementary steps that the complex process typically involves. It will often be clear in what sequence the steps are to occur, and how many times they may be repeated, but this need not always be the case.

4.2. Regular Expressions

In several respects, language use is paradigmatic for complex actions and processes. For some linguistic devices, such as words, sentences, and poems, there are explicit rules of typicality that determine, to some degree of precision, their internal structure. Simple processes in this context include utterances of syllables or writings down of letters of the alphabet. Accordingly, written documents may be compared to types of utterances. Like a type, a written text does not occur, but it specifies the structure of something that may occur: a sequence of elementary utterances. Without necessarily adopting the view that written texts simply are types of utterances, one may still say that they relate to utterances in a way similar to the way in which types of occurrences relate to their instances. Here, we are interested in only one of the similarities between texts and types.

In order to search a text file for the occurrence of a given word, one may write a computer program that parses all of a text’s elementary constituents and checks whether they anywhere match a certain pattern. For instance, in order to search for the word ‘bench’, a program may check whether there is any point where the letters b, e, n, c, and h occur in that order. This program will identify a sequence of phonemes according to a rule that may also be used as a recipe for producing this sequence of phonemes.

Further, a more flexible program may be written in order to identify more general patterns. Such a program may for instance search for all words in a given text that begin with a ‘b’, contain three further letters of any kind, and then end with an ‘h’. In order to give such search instructions in a compact and convenient way, so-called regular expressions have been
developed. For example, one may adopt the convention that an expression like ‘b.{3}h’ shall represent any string that begins with a ‘b’, contains exactly three further letters of any kind and then ends with an ‘h’.

This procedure should admit of further generalization, so that complex processes of all kinds may be specified by using regular expressions. In order to write a program for identifying process occurrences by using regular expressions, a programmer would merely have to specify a set of variables and operators such as ‘.’ and ‘{3}’, and a set of constants that refer to simple occurrents. A generalized regular expression would thus match patterns of all kinds of occurrents, not only of linguistic utterances.

Such regular expressions will match actual processes not by describing the exact temporal duration and order of their stages. There are more appropriate and better known devices for describing and specifying a given process in such detail; examples include movies, calendars, or clocks. In contrast, recipes and generalized regular expressions only specify the most general order of steps that a complex process involves, and do not specify how much time the constituent occurrents will take. References to time may be added in a second step if necessary (think of ‘boil the egg for five minutes’ as part of a recipe).

The existing rules for constructing regular expressions are rather complex and will not be discussed in detail here. An example must suffice. At the beginning of a typical gastroscopy, a nurse will turn the patient onto her left side, a process which we will represent by the letter a. (For the sake of simplicity, we assume that being turned on one’s left side by a nurse is a simple process. Otherwise, it will be easy to supply detailed instructions on how it is done, and insert them in place of a.) Second, the endoscopist will usually spray the patient’s throat with a local anaesthetic (b), and in some cases she will apply a light sedative (c). During the insertion of the endoscope via the esophagus (d), the patient should swallow (e) several times until the endoscope has reached the bottom of the stomach (f). And so on. The initial segment of the operation can now be specified by giving the following generalized regular expression:

\[ ^{abc?}(de?)^{+}f \]

‘^’ marks the beginning of the process, telling us that a occurs at the very beginning of a typical gastroscopy. Immediately after a, b will occur

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60 For instance in the programming language PERL (see www.PERL.org).
exactly once. The question mark immediately following ‘c’ indicates that c may either be done once or may be omitted (i.e. c is optional). The parentheses group the expression ‘de?’ which refers to a complex subprocess consisting of the movement of the endoscope (e) and an optional swallowing (d?). This subprocess may be repeated any number of times, which is indicated by the ‘+?’ Here, the question mark has a different function than in the other two cases. It tells us that the process (de?) shall be repeated at most until f occurs; that is, until the bottom of the stomach is reached.

In this way, we may use regular expressions in order to specify the typical form of all kinds of processes. Since generalized regular expressions describe the typical course that a kind of occurrent takes, we may use them in order to specify standards of typicality that apply to these kinds of processes.

5. Types: Their Parts and Their Instances

Generalized regular expressions serve mainly to describe in outline the structure of a given type of process, and they apply only mediately to their instances. Only a typical gastroscopy includes all the steps in the exact way that is specified by the regular expression. It may well happen that the physician leaves out a step of the operation or calls it off before it is complete. When this happens, she will have been performing a gastroscopy, but she will not have done everything that belongs to a typical gastroscopy. As long as she was performing it, however, it was a gastroscopy that she was performing, since she will then have done everything that belonged to a gastroscopy up until that stage. Even if she has not yet completed the operation, she is already performing it and nothing less.

Against this, one might object that the physician does not perform a complete gastroscopy before she has actually done everything that belongs to an operation of that kind. However, this would be to confuse a type of occurrent with its instances. The type must include the steps, but its present instances need not. For when a physician performs a gastroscopy, she does not (indeed, cannot) immediately and simultaneously perform everything at once that belongs to such an operation, but must perform only one thing at a time. But this cannot mean that she is not in every moment, while performing the gastroscopy, performing all of the steps that a gastroscopy requires. The fact that the gastroscopy unfolds over time does not imply
that, before she has completed it, she is performing an *incomplete* gastroscopy. Even before it is complete, it is a gastroscopy that she is performing.

For if, in order to be said to be performing a gastroscopy, the physician would have to perform every step belonging to one, it would be impossible for anyone ever to *be performing* a gastroscopy – that is, to be *in the course of* performing one. For suppose for a moment that, as long as a physician has not yet performed every step belonging to a gastroscopy, she *is* not yet *performing* one. On the other hand, it should be clear that as soon as she has completed the last step, she *is* no longer *performing* a gastroscopy. This would mean that the only instant at which we could correctly say that she is performing a gastroscopy would be the instantaneous and infinitely short event that constitutes the end of the last step. But we certainly do not want to say that performing a gastroscopy takes no time. In order to prevent this unintuitive result, we will have to say that the physician already *is performing* the gastroscopy before she carries out the last step. This means that she also is already performing a gastroscopy even if she should ultimately fail to carry out the last step.

5.1. *Duration by Virtue of Type*

We see again that types of occurrents differ essentially from their instances. The specification of a type must be complete in order to be a specification of this type and not of another one. If we leave out the last step of a gastroscopy from a specification of this type of occurrent, we alter the specification in such a way that it turns into a specification of something else. In contrast, by leaving out one step of a particular gastroscopy, the occurrent in question does not turn into something else. For all along, up to the point at which the last step was left out, it was true to say that what was going on was a gastroscopy; this truth cannot suddenly turn into a falsehood. A token gastroscopy with a missing step is still a gastroscopy, but an atypical or incomplete one.

This means that it is not essential for a token occurrent that all parts belonging to its type actually be instantiated. The parts of a gastroscopy do not *immediately* belong to what the physician does when she inserts the endoscope, since the physician may do everything that is required *at this stage* without doing everything else that belongs to a gastroscopy. What she is doing right now has the other steps that are involved in a gastroscopy as its parts only because it instantiates a *type* to which these parts are
essential. Thus in some sense, what the physician does is only one single thing, moving the endoscope, whereas in another sense, she is performing a complex operation with several parts. What she does is complex only by virtue of its instantiating a complex type.

Does this not again imply that instances of occurrents are infinitely short? For if we may say that in one sense what the physician performs is only a simple hand movement, we may further say that in the same sense, what she is performing is only that part of this movement that happens exactly now, which is infinitely short.

However, since the very same movement instantiates both the type ‘movement from here to there’ and the type ‘gastroscopy’, it would be wrong to say that it is only a simple hand movement. Whereas it is correct that every bit of the movement, however short, will also instantiate the type ‘gastroscopy’, it is wrong to identify the duration of one of them with the duration of the entire operation, since in fact a gastroscopy typically takes 10 or 15 minutes. What the argument shows is rather that the duration of an event is strictly relative to the type that it instantiates. If we take something as an instance of ‘movement from here to there’, it may take two seconds, but if we take the very same occurrent as an instance of the type ‘gastroscopy’, it will take longer. It does not make sense to say that this token occurrent has its very own duration, independently of any type that it instantiates. Rather, occurrents have their duration only by virtue of being of a certain type.

Hence, the duration, as well as the internal temporal structure and components of a token occurrent, belong to this particular only by virtue of its being of a certain type. How long a given occurrent takes and what structure it has will depend on the type which we say that it instantiates. Taken as an instance of ‘handling of the endoscope’, what happens may last 3 minutes; taken as an instance of ‘gastroscopy’, it may last 13 minutes. This does not mean, however, that we may arbitrarily choose how to refer to something and thus arbitrarily determine how long it takes. We cannot invent the types that a particular instantiates; we can only choose among them. The movement of the physician, for instance, may be taken to instantiate either the type ‘insertion of the endoscope’, or the type ‘gastroscopy’, but it will never be correct to say that it instantiates a type such as ‘having breakfast’. There is always a fixed range of types that an occurrent may be taken to instantiate, and which types make up this range depends on actual circumstances in the real world, not on our imagination or willpower.
5.2. *Past Occurrents*

We have claimed that a particular occurrent has its duration only by virtue of being of a certain type. Against this, it might be argued that there are past occurrents, which are tokens and have a concrete duration. Suppose that a physician in fact spends 20 minutes performing a particular gastroscopy. In this case, there will be a duration associated with the concrete instance, and it will not be the ten minutes that a typical gastroscopy takes. Hence, it seems that the duration of a token gastroscopy may differ from the duration that it has by virtue of its type.

But first, it is simply wrong that a past gastroscopy has a duration. The reason is that there are no past gastroscopies. By assumption, past gastroscopies are past and over, and thus one may only say that there was a past gastroscopy which had a certain duration. Past gastroscopies do not occur (but rather have occurred), and hence, there are no past instances of the type ‘gastroscopy’ (rather, there were such instances). That there are no past occurrents should be as obvious as, say, that future events are not the ones that have already happened.

To insist on the proper use of the past tense in this way may seem pedantic, but it has repercussions for the question whether a past, concrete gastroscopy may, as such, be said to have a concrete duration. For as long as the past gastroscopy was still occurring, it did not yet have its concrete duration. As long as it existed, it was not yet over, and something might have happened that would have made it longer. Shifting from present to past gastroscopies thus makes no difference, since in order to attribute a duration to a past gastroscopy, we have to situate ourselves in the past, as it were, and from that point of view we cannot yet know its duration. There can be no time at which there is a token gastroscopy that would, as this very token, have a concrete and fixed duration.

Second, it may well be that a gastroscopy in fact took 20 minutes. This will be an atypical duration for a gastroscopy, but that will not mean that it did not have this duration also by virtue of being of a type. It had this atypical duration only insofar as it was correctly taken to be an instance of the type ‘gastroscopy’, not insofar as it may also correctly have been taken to be an instance of the type ‘insertion of the endoscope’.

All in all, types of occurrents differ from their instances in the following important respects. First, the distinction between occurrents with and without an internal temporal structure is applicable strictly speaking not to tokens, but only to their types. Second, token occurrents may instantiate
several types at once, for instance the types ‘hand movement’, ‘insertion of
the endoscope’, and ‘gastroscopy’. This means that, thirdly, token
occurrents have their duration only by virtue of instantiating one of their
several possible types. Taken as a simple hand movement, this token
occurrent may be correctly said to take two seconds; but taken as a
gastroscopy, the very same token occurrent may be taken to last for 10
minutes.

5.3. Types of Occurrents Instantiated by Their Parts

Put in a pointed way, this means that types of complex processes may also
be instantiated by instances of their proper parts (see Allen, 2005, 23-37).
Turning the patient on her side and applying the spray are only parts of a
typical gastroscopy, but when they occur, they are also fully fledged
instances of that type. For we may point at the event at any time and say:
‘what is occurring here and now is a gastroscopy’. If this is correct, it
indicates an important difference between token occurrents and token
continuants. For instance, the type ‘bench’ is instantiated only by the
complete bench, not by any of its parts in isolation. Although a bench may
lack parts, or be atypical and incomplete, yet still be what it is, it would not
be correct that, say, one of its feet alone instantiates this type. In contrast,
the very beginning of a gastroscopy, the nurse’s turning the patient on her
left side, will already fully instantiate the type ‘gastroscopy’.

Alvin Goldman (1970) has claimed that this is not the case. According
to Goldman, a token event does not instantiate several types at once, but
rather, someone who performs a gastroscopy and during its course inserts
an endoscope does two different things at once: first, she performs a
gastroscopy, second, she inserts the endoscope. Now it is perfectly possible
to do two things at once, for instance, to perform a gastroscopy while
chatting with the nurse. But this is certainly not what happens when the
endoscopist inserts the endoscope and performs the gastroscopy.
Otherwise, the same logic will imply that when she inserts the endoscope
thus far in the course of inserting it farther, she is doing two things at once.
And this will quickly lead to the claim that everyone is always doing
ininitely many things at once. A theory that leads to such a claim is surely
neither useful nor representative of reality.
5.4. A Tree Diagram

The occurrent resulting when a doctor inserts an endoscope in order to perform a gastroscopy belongs to multiple types; to help us understand this we may think of the way in which a beaver may be said to belong to different types. A beaver is at the same time a rodent, a mammal, and a chordate, but this does not imply that a beaver is actually three different things at once. Rather, for this beaver, being a rodent is included in what it is to be a beaver. In a similar way, at some certain time instant, performing a gastroscopy is included in what it is, in the case of this endoscope insertion, to insert an endoscope, and we need not suppose that performing a single step and carrying out the whole procedure to which it belongs are two different simultaneous occurrents. Further, like the several types that a beaver instantiates, the several types that the movement of a doctor instantiates while she is performing a gastroscopy may be arranged in a tree diagram.

Types of complex processes may be specified by rules that describe the nature and order of the elementary steps that are involved. Since these steps are, during their occurrence, also instances of the respective parent process, we may take them to be leaf nodes that belong to the complex process as their root node in a tree diagram. Such a tree diagram will not have as much expressive power as a regular expression as defined above. We may indicate in a tree diagram which step involves what further steps, but not how often they shall be repeated, whether they are optional, or whether they are to be taken in an exact order.

Nonetheless, a tree diagram is a helpful tool for visualizing the structure of a complex process. Its root node will stand for the entire process, and it will branch into its immediate and possibly still complex parts. These parts may then have further leaf nodes. The ultimate leaf nodes will stand for elementary occurrents. As a rule, every token occurrent will also instantiate the types to which the respective parent nodes and their parent nodes refer.

The following, admittedly fragmentary and simplistic tree diagram, for instance, might represent a typical gastroscopy:
Whereas a regular expression only specifies the arrangement of the elementary steps that a complex process involves, the tree diagram bundles them into rough steps which are themselves subject to division into further, more basic steps. It looks a bit like the diagram in section 2.6 above, that is, like a taxonomy of different types of occurrents. On the other hand, it may seem to represent a partonomy; that is, a hierarchy of wholes and their parts. However, tree diagrams of the kind under consideration here neither represent taxonomies nor do they represent partonomies. Rather, they provide a visualization of the different ways of referring to the token occurrents that are typically involved in a complex process. Such a diagram does not tell us that every insertion of an endoscope is also a gastroscopy or vice versa; nor does it tell us that every insertion of an endoscope is part of a gastroscopy. All it says is that some particular token movement of an endoscope, if it occurs in the course of an endoscopy, may also be taken to be an instance of the types ‘inserting the endoscope’ and ‘gastroscopy’. What it represents is thus not a general hierarchy of types of occurrents, but only a hierarchy of types that one token may be said to instantiate at a time.

The diagram should not be taken to represent a partonomy because it is in any case problematic to speak of the parts of a token occurrent. As we have seen, particular instances of occurrents are complex only by virtue of instantiating a certain type. As a consequence, what parts a concrete token
occurent may be said to have also depends on the type that it is taken to instantiate. A token occurent may be said to have a part if its type has this part. However, types of occurrents do not have temporal parts, since they do not occur; only occurrents themselves have temporal parts. Nor is it clear in what other sense an abstract entity like a type may be said to have parts. The only thing that plainly has parts is the recipe by which we specify the type, but these parts are also not temporal parts. Further, as a matter of logic, nothing can be identical with its own proper part, since a proper part of X is defined as something other than X that is part of X. Neither the type nor the recipe is identical to their proper parts. But in the case of an ongoing gastroscopy we would want to say, first, that inserting an endoscope is part of, and something other than, performing the gastroscopy, since it may also occur in other contexts, but also that inserting this endoscope here and now is the very same as performing a gastroscopy here and now.

Thus, it seems that token occurrents may be identical to their proper parts. We should conclude that we had better avoid the word ‘part’ when it comes to instances of temporal entities. When we say that a token occurent has parts only mediately, that is, by virtue of instantiating a certain type, we circumvent this difficulty, since the type is not a temporal entity and may thus be said to have non-temporal parts (which are determined by the parts of the corresponding recipe). In any case, the tree diagram should not be taken to represent a partonomy, since its nodes stand for token occurrents, and these token occurrents should not be said to have parts (other than in the mediate sense, namely: by virtue of being of a certain type).

Let us note, in passing, that although our standard example of performing a gastroscopy is an intentional action, everything that we have said also applies at least to other natural processes, such as digestion, the movements of animals, and the growth of plants. Moving the hand is an instance of performing a gastroscopy not only because the physician intends to perform a gastroscopy when moving her hand. We may in fact say, without any conceptual difficulties, that an animal or plant, and even a machine, performs a complex task by performing steps that are involved in it, and draw a tree diagram representing the relations between the different ways of referring to what it does. For instance, what a hydrangea does when it grows may be divided into several elementary steps A, B, C, such that we may point at it and say that right now, what it is doing instantiates both the type A and the type ‘growing’.
5.5. Necessary Incompleteness

A token process must be taken to be already occurring before it is over, since it would not any longer occur when it is over. If the endoscopist inserts the endoscope at all, she is already doing it before she is done with it, since she would not be doing it any longer when the task is completed. We see what steps are involved in a complex process by looking at its type, and the specification of the type will tell us when this type of process is complete or over.

This is another respect in which temporal entities differ from non-temporal entities. Even if nothing should be perfect in this world, we may at least imagine a perfect thing, say, a perfect endoscope. Such an endoscope will possess all and only the features that an endoscope is supposed to possess. In contrast, it is simply impossible to imagine a perfect, that is complete, process. When we imagine a process, we must imagine it as going on, and as long we imagine it as going on, we will imagine it as not yet being over. As soon as it is over, it will no longer occur; and since for a process, to exist is to occur and to be complete is to be over, no complete process can possibly exist, as complete, at present. Hence, processes are present only as long as they are incomplete (see Aristotle, *Metaphysics* IX, 6, 1048b30). However, there are objections that may be raised against this view, which will be discussed in the following two sections.

5.6. The Coast of Norway

A token process appears to unfold in time just as, say, the coast of Norway extends in space. And although there is no single spatial location at which the coast of Norway is complete, the coast is nonetheless completely present throughout the entire extent of space that it occupies. Likewise, one may want to say that although a gastroscopy is complete at no single instant during its occurrence, it is complete throughout the entire stretch of time that it occupies.

This way of speaking seems to be plausible, but only on the basis of an illusion. We may see that the coast of Norway is completely present within a spatial region by traveling along this coast. Besides the three spatial dimensions that it occupies, there is a further dimension, time, which allows us to inspect all of its parts, not all at once, but one at a time. Further, that the coast of Norway is completely present throughout a spatial
region means that that there is a single instant at which it is everywhere in
this region. That it is completely present means precisely that it is now here
and there – that is, at one and the same time.\footnote{Consider the fictional case of a coast segment that changes its shape and moves with
us wherever we move. This coast segment would not be present throughout the spatial
region in which we observe it, but it would first be here, then there. In order to know
whether what we see is the complete coast of Norway, we must exclude this
conceptual possibility.}

In contrast, no token process is simultaneously at its beginning point,
going on, and almost over, and there is no fifth dimension along which we
could travel, as it were, in order to inspect all its parts. There is no ‘time’ at
which all stages of a token occurrent could be simultaneously present.

5.7.\ Four-dimensionalism

Time is often taken to be a fourth dimension similar to the three spatial
dimensions, and accordingly, occurrents are taken to be something like
four-dimensional objects. This may do as a technique for mapping
processes onto a four-dimensional coordinate system. Locations in
Euclidean space may be represented by triples of numbers that describe
them relative to the origin of a coordinate system, which will be
represented by the triple (0,0,0). The location one unit left of the origin, for
instance, may be represented by (-1,0,0). Three-dimensional objects can
then be specified by sets of triples, such as \{(0,0,0),(-1,0,0),\ldots\}. The same
procedure may be applied in order to describe temporal entities. In order to
do this, one may add a fourth number to each triple, representing a
temporal instant relative to some temporal origin. Occurrents will thus be
represented by sets of quadruples of numbers, referring to locations in a
four-dimensional coordinate system.\footnote{This is not the same as to take snapshots of a complete situation containing three-
dimensional objects and arranging them along a temporal axis, as it is done in Basic
Formal Ontology. See \textit{BFO}; Grenon, \textit{et al.}, 2004; Grenon and Smith, 2004; Grenon,
2003. \textit{BFO} does not identify continuants or occurrents with the sums of such
snapshots.}

One should not suppose, however, that nothing essential is lost when
occurrents are represented in this way. What is lost when occurrents are
transformed into sets of quadruples of numbers is precisely their
temporality. Nothing about a quadruple of numbers in itself tells us which
of the numbers refers to time, and without a convention according to which
one of the numbers is to be read in a special way, the quadruple may as
well stand for spatial objects plus any other further dimension; say, their weight. Given that this is the case, consider what we are supposed to do when properly reading the fourth number. In order to read it, we have to relate the number to real or imagined temporal instants. We basically perform the same task as a DVD player: we map raw data, which is not an occurrent, onto a stretch of time so that an occurrent results. We map one of the four numbers onto real time, \textit{first} reading one of the remaining triples, \textit{then} the next one and so on. Since carrying out this very procedure is an occurrent, we re-introduce time in order to read the quadruple as a representation of something temporal. Note further that nothing about the set of quadruples of numbers in themselves tells us how \textit{fast} we shall turn from one step to the next. The temporality of occurrences is thus in fact not preserved in their four-dimensional representation. Sets of quadruples only contain the data that must be mapped onto real time by performing a real process in order to represent something temporal. That is, although it may be very useful to isolate this data, quadruples of numbers should not be taken to represent all there is to occurrences. Occurrences, that is, are not four-dimensional entities.

If occurrences are not four-dimensional entities, however, there is no sense in which a process may be said to be completely present in the same way in which the coast of Norway may be said to be completely present. Rather, token processes are necessarily incomplete as long as they exist.

6. Conclusions

It has emerged that there are certain properties, such as structure and duration, which token occurrences have only mediately, that is, insofar as they instantiate certain types. Similarly, the distinction between instantaneous and extended occurrences can only be drawn properly at the level of types of occurrences. What happens right now when the physician performs a procedure is, under one of its possible descriptions, an instantaneous event; under other equally possible descriptions it is extended, elementary, or complex. Whenever we refer to some specific occurrence, we must refer to it as an instance of a certain type and, depending on this type, it will have different properties. For instance, referred to as a gastroscopy, what the doctor is doing right now will have a typical duration of 10 to 15 minutes, and it might turn out to have had an actual duration of, say, 13 minutes. Taken as an instance of inserting the endoscope, however, the very same occurrence will have a different typical
and actual duration. The different types which a token occurring may instantiate may be brought into a system or hierarchy that may be represented by a tree diagram.

We have also shown that every currently occurring token process is necessarily incomplete, and that there are no complete processes. (There are occurrences other than processes, namely *energeiai*, that may be complete before they are over.) Past processes may be said to be complete, but only because they no longer exist. They have occurred in the past and are now complete. Further, past occurrences can only be understood as occurrences that once were present; that is, no reference to past occurrences will clarify the nature of present occurrences. Hence, that every past process has in fact had a specific structure and duration does not imply that present processes have such a structure and duration independently of their type.

Further, we argued that, although the concrete structure of token processes may be mapped onto a four-dimensional coordinate system, this should not be taken to imply that they are, in fact, four-dimensional entities. A set of quadruples of numbers counts as a representation of an occurring only if there is a procedure by which the time index may again be mapped on real time instants. But first, this procedure will add back in the time that was lost in the representation, and second, the procedure itself is an occurring. Hence, it is not possible that all occurrences should be encoded by sets of quadruples. Again, since occurrences are not four-dimensional entities, there is no sense in which they could be said to be complete as long as they exist.