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RULES OF CONCEPTUAL WELL-FORMEDNESS AND OPTIONAL vs. OBLIGATORY ITERATIVITY

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1 Introduction

Consider the interpretation of the sentences in (1)-(3) below.

(1) (a) John sneezed.
(b) John played on the beach.

(2) (a) John sneezed frequently.
(b) John often played on the beach.

(3) (a) John sneezed for two hours/years.
(b) John played on the beach for two hours/years.

The sentences in (1) can have either an iterative or a semelfactive interpretation, depending on the (linguistic or non-linguistic) context in which they are interpreted.[1] In (2) the addition of the underlined frequency adverbials eliminates the possibility of a semelfactive interpretation, with the result that these sentences have an obligatory iterative interpretation. In (3) the addition of the underlined durational adverbial leads to an obligatory iterative interpretation for the (a)-sentence, but not for the (b)-sentence.[2]

The possibility of both an iterative and a semelfactive interpretation for the sentences in (1) can be accounted for on the assumption that the event expressions appearing in them are unspecified with respect to the iterative/semelfactive distinction.[3] The obligatory iterativity of the sentences in (2) is unproblematical, given two assumptions: (i) that the notion of repetition is part of the lexical meaning of

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the underlined frequency adverbials, and (ii) that the meaning of a sentence is composed on the basis of the meanings of its constituents. The contrast between the obligatory iterative interpretation of (3a) and the optional iterative interpretation of (3b) is more problematical.

Questions surrounding the problem of iterativity in sentences such as (3) have received some attention in the recent literature.[4] Studies which attempt to answer such questions within a generative grammar framework include (Verkuyl 1972), (Verkuyl 1976), (Daalder 1974) and (Platzack 1979). For instance, Verkuyl (1972) explored possible answers to such questions for Dutch within a generative semantics framework, while he (1976) explored alternative answers within an interpretative semantics framework. The most detailed interpretative account of obligatory iterativity is provided by Platzack (1979): chapter 5), who tries to account for the optional vs. obligatory iterative interpretation of certain Swedish sentences within the framework of Jackendoff's (1972; 1978) theory of interpretative semantics.

Platzack considers the obligatory iterative interpretation of (amongst others) the Swedish equivalents of English sentences such as (3a). He argues that the correspondence rules, which are responsible for composing the meaning of a sentence from the meanings of its constituents, are also responsible for deriving the obligatory iterative interpretation of the sentence in (3a). The essence of Platzack's proposal is that the Swedish equivalents of the durational adverbials in (3) have a selectional restriction which prevents them from being combined with the type of event expression that appears in (3a), unless these event expressions are "pluralized". Such a pluralized event expression then has an obligatory iterative interpretation. In addition to the Swedish equivalents of the *for x time* durational adverbials, there are other linguistic units in Swedish which can force an iterative interpretation for event expressions such as those in the (a)-sentences above. Platzack discusses one of

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these, namely, the Swedish equivalent of the English verb *cease*. He proposes that this verb shares the selectional restriction of *for x time* durational adverbials; that is, it also requires pluralization of the type of event expression appearing in the (a)-sentences above. Since the type of event expression appearing in the Swedish equivalents of sentences such as (3b) does not trigger the selectional restriction, the Swedish equivalent of the English sentence in (3b) also does not have an obligatory iterative interpretation.

A solution of the type proposed by Platzack to the problem of accounting for obligatory iterativity has at least one major shortcoming. Such a solution can provide no principled answer to the question of why only certain sentence constituents trigger an obligatory iterative interpretation, and then only for certain types of event expressions. A solution in terms of selectional restrictions amounts to little more than a stipulation that certain expressions have the common property of triggering an obligatory iterative interpretation for certain types of event expressions.

The aim of the present study is to explore some of the consequences of adopting a novel approach towards questions of obligatory and optional iterativity, in the hope of overcoming the above-mentioned shortcoming. In particular, an attempt will be made to account for optional and obligatory iterativity within the framework of the most recent version of Jackendoff's theory of interpretative semantics, namely, Conceptual Semantics. This theory is set out in (Jackendoff 1983; 1987a; 1987b). One of the most interesting features of Jackendoff's theory is the role which so-called rules of conceptual well-formedness play in determining sentence meaning. It will be argued that such rules form an integral part of a principled answer to the question of why sentences such as (3a) have an obligatory iterative interpretation, while sentences such as (3b) have an optional iterative interpretation. It will be argued on the basis of English data that an account

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of obligatory and optional iterativity in terms of rules of conceptual well-formedness can overcome the problem noted in connection with the type of account proposed by Platzack (1979). That is, it will be argued that the proposed theory can provide a principled explanation of why a wide range of English expressions trigger an obligatory iterative interpretaiton, while others do not.

The theory proposed here also makes predictions about iterativity in languages other than English. Within the scope of this article, very little attention can be given to the question of the possible cross-linguistic implications of the proposed theory. Some evidence which bears on the correctness of the cross-linguistic predictions will, however, be considered.

The analysis presented here will be based on a distinction between various types of events to which sentences can refer. However, no attempt will be made to account for the full range of event types that play a role in the distinction between optional and obligatory iterativity. The focus will be on **punctua**l events and **unbounded** events. Punctual events are conceptualized as being punctual or momentary. Unbounded events, or processes, are conceptualized as having duration with no definite, natural point at which they must terminate.[5]

In par. 2 below some of the fundamental assumptions of Jackendoff's (1983) theory of Conceptual Semantics are listed. In par. 3 some fundamental assumptions about the meaning representations assigned to the sentences in (1) by the correspondence rules are set out. In par. 4 the question of the obligatory iterative interpretation of the sentence in (3a), plus that of several other sentences, is considered. In par. 5 the interpretation of sentences such as (3b) is considered. In par. 6 some further questions arising from the proposed account will briefly be touched on.

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2 Jackendoff's theory of Conceptual Semantics

A detailed account of Jackendoff's theory of Conceptual Semantics cannot be given here. The main assumptions of the theory that are relevant to the discussion can be summarized as follows:[6]

A. The meaning of a linguistic expression is encoded in the mind of the language user in the form of a conceptual structure. That is, meaning representations (= semantic structures) are conceptual structures.

B. There is a single level of conceptual structure at which linguistic, sensory, and motor information are compatible. Semantic structures are just a subset of conceptual structures, namely, those conceptual structures which are verbally expressible.

C. There is a system of innate, universal rules of conceptual well-formedness which restrict the set of possible conceptual structures attainable by a human being.

D. Although rules of conceptual well-formedness are assumed to be universal, provision is made for some variation across individuals and across cultures, given differences in experience.

E. The conceptual structures associated with linguistic expressions convey information about the projected world, i.e., the world as experienced through the human mind, and not the real world.

F. The meanings of linguistic expressions are decompositional. That is, meanings have an internal structure made up from a finite innate stock of primitives and principles of combination.

G. There is no formal distinction of level between semantics and pragmatics.

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H. In addition to the rules of conceptual well-formedness referred to in C. above, there are two other types of mechanisms responsible for associating linguistic expressions with conceptual structures. The correspondence rules relate conceptual structures with the syntactic structure of linguistic expressions, where such syntactic structures are determined by various types of syntactic rules and the lexicon. Rules of inference map conceptual structures back into conceptual structures. In accordance with the assumption set out in G. above, there is no formal distinction between "purely" semantic rules of inference and pragmatically based rules of inference.

3 The conceptual structures associated with event expressions

According to Jackendoff (1983:49-50), one of the ontological categories of the projected world is # event #.[7] Consequently, conceptual structure must contain constituents whose major feature is [EVENT]. The major feature of the conceptual structures associated with both the expressions in (1) is [EVENT]. The expressions in (1) will be referred to as "event expressions" below.

As regards their conceived extension in time, there is a fundamental difference between the events referred to in (1a) and (1b). The event referred to in (1a) is conceived of as being punctual, or momentary; that is, as having the extension in time of a point.[8] In contrast, the event referred to in (1b) is conceived of as having extension in time, and moreover, as having unbounded extension in time, in the sense that there is no specific point at which the situation will necessarily terminate. Some more examples of sentences containing punctual event expressions are given in

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(4) below, while in (5) some more examples of sentences containing unbounded event expressions are given.

(4) (a) The light flashed.
(b) The ball bounced.
(c) The ball hit the wall.
(d) John blinked his eye.

(5) (a) Sue sang sad songs.
(b) Mary baked cup cakes.
(c) John worked in my room.
(d) Peter jogged on the mountain road.

Let us then assume that the conceptual structures associated with the sentences in (1a) and (4) contain both the concepts [EVENT] and [PUNCTUAL], while the conceptual structures associated with the sentences in (1b) and (5) contain both the concepts [EVENT] and [UNBOUNDED].[9] The differing interpretations of sentences such as those in (3) provide some evidence for the incorporation of the units [PUNCTUAL] and [UNBOUNDED] into the conceptual structures of event expressions, as will be argued in detail below. Further evidence of the need for such a distinction comes from the fact that the event expressions in (1a) can be combined with a temporal adverbial which relates the event to a single, unique point in time, while the expressions in (1b) cannot be combined with such adverbials. Thus, (6a) is acceptable, while (6b) is unacceptable.

(6) (a) John only sneezed once, at 11h35, on Monday 26 August 1987.
(b) *John only slept once, at 11h35, on Monday 26 August 1987.[10]

In addition to punctual and unbounded events, a third type of event is usually distinguished, namely, bounded events.

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Expressions such as *Sue baked a cake* and *John ran a mile* refer to bounded events. Bounded events are like unbounded events --- and unlike punctual events --- in that they have duration. They are like punctual events --- and unlike unbounded events --- in that there is a definite point in time associated with them.[11] Some very interesting questions arise in connection with the optional vs. obligatory iterative interpretation of bounded event expressions. For reasons of space these questions cannot be explored in any detail in the present study, and they will only be referred to very briefly in par. 6.

4 The obligatory iterative interpretation of punctual event expressions

4.1 *For x time* durational adverbials

Intuitively, it seems to be fairly clear what underlies the obligatory iterative interpretation of sentences such as those in (3a). If an event is conceived of as having the extension in time of a point, then the information that the event was extended over more than one point in time only makes sense on the assumption that several occurrences of the punctual event were distributed over the period of time concerned. An iterative interpretation will thus result. Without going into the details of the precise contribution which the durational adverbials in sentences such as (3) make to the meaning representations of the sentences in question, it seems uncontroversial that they contribute the information that the situation referred to was extended for a certain period of time. For instance, all these adverbials can be used to answer the question "For how long did the event take place?". Let us assume for the sake of argument that this information is represented by the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME].[12] The intuitive idea about what underlies the obligatory iterative interpretation of sentences

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such as (3a) can then be expressed in the form of the following rule of conceptual well-formedness:

(7) Conceptualize the combination of units of information [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME] as [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME, ITERATIVE].

It will be assumed here that such rules of conceptual well-formedness do not distinguish between units of information which are assigned directly to the meaning representation of a sentence by the correspondence rules, and units which are derived from such units by means of inference rules.[13] Thus, it is irrelevant whether the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] appears in the meaning representations assigned to the sentences in (3) by the correspondence rules, or whether it can only be derived by inference rule from other units of information contained in the latter representation.

Note that rule (7) is not itself a correspondence rule. It applies to the output of the correspondence rules. That is, rule (7) derives the unit [ITERATIVE] from the co-occurrence of certain units of information in the representations derived by the correspondence rules (and possibly some inference rules.

The account proposed above for the obligatory iterative interpretation of (3a) makes very specific predictions about the interpretation of English sentences other than those which contain *for x time* durational adverbials. Rule (7) predicts that all sentences whose meaning representations contain the combination of units of information specified in the rule will have an obligatory iterative interpretation. There is in fact a great variety of English sentences of which it can plausibly be argued that their meaning representations contain the units [EVENT, PUNCTUAL, EXTENDED OVER

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MORE THAN ONE POINT IN TIME]. In the following sections it will be argued that rule (7) can in fact account for the interpretation of several of these sentences.

4.2 Other durational adverbials

There are several other durational adverbials which are similar in meaning to the *for x time* durational adverbials illustrated in (3), although they differ in form from the latter. Specifically, they all add to the meaning representations of the sentences of which they form part the information that the situation referred to was extended over a period of time. For instance, the durational adverbials presented in (8) below can also be used to answer the question "For how long did the event occur?".

(8) all day; throughout the weekend;
until 5 o'clock; all afternoon

If any of these adverbials is added to one of the sentences in (1a) and (4), the resultant sentence has an obligatory iterative interpretation. It seems plausible that these adverbials, like the ones discussed above, contribute to the meaning representations of the sentences of which they form part the unit of meaning [EXTENDED OVER MORE THAN ONE POINT IN TIME]. Thus, the meaning representations of all the sentences in question will contain the three units of information to which rule (7) is applicable. Consequently, rule (7) will derive an obligatory iterative interpretation for these sentences. Rule (7) can thus account for the obligatory iterative interpretation of the sentences in question.

There is another set of adverbials which can also be used to answer the question "For how long?", although they can have other interpretations too.[14] Consider, for instance, the adverbials listed in (9).

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(9) since yesterday night; from yesterday morning until now; between 5 o'clock and 6 o'clock; until now.

When any of these adverbials is added to one of the sentences in (1a) and (4), and the sentences in question are interpreted as answers to the question "For how long?", the resultant sentences have an obligatory iterative interpretation. Again it seems reasonable to assume that the adverbials in (9) (under the relevant interpretation) contribute the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] to the meaning representations of the sentences of which they form part. Consequently, rule (7) will account for the interpretation of these sentences.

There are two complications regarding the interpretation of punctual expressions combined with durational adverbials which must be noted here. Firstly, certain expressions which are used to refer to an event which is normally conceived of as punctual can also be used in English to refer to the durative stages leading up to the occurrence of this punctual event. For instance, the expression *to die* is normally taken to refer to a punctual event. Consider, however, the interpretation of the following sentence:

(10) He died for two days.

For reasons that will be discussed in par. 4.7 below, the situation of someone dying cannot be conceived of as being repeated. Consequently, an iterative interpretation is excluded for the sentence in (10). The sentence can, however, have a semelfactive interpretation. Under the latter interpretation the durational adverbial refers to the period of time in which the individual concerned was in the process of dying. That is, the durational adverbial is interpreted to refer to the duration of the process leading up to the moment of death.[15] Another expression which is ambiguous between

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a "true" punctual interpretation and the type of durative interpretation isolated here is *to win*.[16]

Another complication arises in the case of punctual expressions which entail a resultant state. Consider for instance the following sentences, taken from (Mittwoch 1980:220-221):

(11) (a) He lent me the book for two weeks/until Monday.
(b) He woke for two hours.
(c) He opened the window for a few minutes.
(d) The lights went out for a few minutes.

These sentences can all have an iterative interpretation, where the durational adverbial specifies the length of the period of time during which the punctual situation referred to occurred. Rule (7) will account for the obligatory iterativity of the sentences under this interpretation. These sentences can, however, also have a semelfactive interpretation, where the durational adverbial specifies the duration of the state resulting from the occurrence of the punctual situation.[17] The difference between the two interpretations must in some way be reflected in the meaning representations associated with the sentences in (11). It seems reasonable to assume that in the case of the second interpretation the various units of meaning will be organized in such a way that they do not jointly represent the information that a punctual event was extended over more than one point in time. The unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] will rather be linked to the resultant state entailed by the verb. Consequently, rule (7) will not be applicable, thus accounting for the fact that under the "resultant state" interpretation the sentences in (11) do not have an obligatory iterative interpretation. The question of how exactly the two interpretations of the sentences in (11) are to be formally represented will not be considered here.

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4.3 Elements expressing the information that the event referred to continued through time

Consider the following sentences, which all have an obligatory iterative interpretation.

(12) (a) Jan kept on sneezing.
(b) Jan continued sneezing.
(c) Jan coughed continuously.
(d) Jan coughed without stopping.

Whatever the precise contribution of the underlined elements to the meaning representations of the sentences in (12), they clearly contribute a common unit of information, namely, that the event referred to continued for a period of time. If an event continued for some time, then it follows that it was extended over a period of time. Thus, it seems reasonable to assume that the meaning representations of all the sentences in (12) contain the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME], or at least some other unit(s) from which this unit can be derived by inference rule. All the events referred to in the sentences in (12) are punctual. Consequently, the representations associated with these sentences will also contain the units of information [EVENT] and [PUNCTUAL]. Rule (7) will thus apply, with the result that the proposed theory correctly predicts that all these sentences have an obligatory iterative interpretation.[18]

4.4 Aspectual verbs

English has a set of verbs which, from the semantic point of view, have in common that they single out a specific phase of some larger process. This "phase" can be either a durative stage forming part of such a larger process, or a specific point in such a process. The verbs picking out such subparts of larger processes are known as aspectual verbs, or

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phasal verbs.[19] Such verbs include, for instance, *start*, *stop*, *resume*, *interrupt*, to mention but a few. When an event expression is embedded under one of these verbs, the sentence clearly has the entailment that the event referred to has duration, i.e., that it has greater extension in time than a mere point. Thus, it seems reasonable to assume either that the meaning representations of sentences such as those in (13) contain the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME], or that this unit of information can be derived from other units of information contained in these meaning representations.

(13) (a) John started to sneeze.
(b) John stopped sneezing.
(c) John's sneezing was interrupted.

Punctual events, which have the extension in time of a single point, cannot have distinct stages. Thus, when an expression referring to a punctual event is embedded under one of these aspectual verbs, the sentence cannot be interpreted to refer to a substage of the punctual event itself. Consequently, when a punctual event expression is embedded under an aspectual verb, the resultant sentence can only be interpreted to refer to a substage of a series of repetitions of the punctual situation. That is, sentences such as those in (13) have an obligatory iterative interpretation. Rule (7) can in fact account for this interpretation. When punctual event expressions are embedded under aspectual verbs, the conceptual structures associated with these sentences will contain the units [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME]. Rule (7) will thus be applicable.[20]

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4.5 Indefinite quantity expressions

In the cases discussed above, the argument for the claim that the meaning representations of the sentences contain the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME], or that this unit can be inferred from the meaning representations assigned to the sentences by the correspondence rules, was fairly straightforward. There are, however, cases where the link between the form of a sentence and its meaning representation is less transparent than in the cases considered above. In such cases the argument for the claim that the meaning representations of the sentences contain the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME] is correspondingly more complex. A case in point is sentences which contain so-called indefinite quantity expressions, such as *a lot*, *too much*, *more than*.

Such indefinite quantity expressions have in common that they specify some quantity for the event referred to, but without specifying the quantity precisely, and without even specifying the dimension on which the quantity specification must be interpreted. Thus, they differ from indefinite durational expressions such as *for a long time*, where there is an explicit indication that the critical dimension is that of time. These expressions also do not contain material which explicitly expresses the information that the event obtained more than once. Consequently, expressions such as *many times*, *more times than x* are excluded from consideration here, since they contain lexical material which explicitly indicates that the event obtained more than once. In (14) below are presented some examples of sentences in which punctual event expressions are combined with indefinite quantity expressions of the type under consideration here. The indefinite quantity expressions are underlined.

(14) (a) John sneezed a lot.
(b) John coughed too much.
(c) This light flashed more than that light.

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Mittwoch (1982:126) observes that when indefinite quantity expressions such as those underlined in (14) co-occur with "intransitive state or process verbs, their meaning is indeterminate (or ambiguous) between duration or frequency (or a combination of both)".[21] The verbs in (14) are all intransitive process verbs, in Mittwoch's sense. Not all the interpretation possibilities mentioned by Mittwoch are, however, available for these sentences. In particular, the durative interpretation without frequency is excluded. That is, these sentences must all have an iterative interpretation.

As was noted above, the sentences in (14) differ from sentences containing duration adverbials in that the latter, but not the former, contain elements which explicitly refer to the dimension of time. Note, however, that in the case of all the sentences in (14) the indefinite quantity expressions are nevertheless interpreted to refer to time. Indirectly, then, all these sentences are interpreted to refer to an event which has "quantity in the dimension of time", that is, which is extended in time. The question now arises how the information that the event referred to was extended in time is introduced into the conceptual structure associated with the sentences in (14). Suppose that the following rule of conceptual well-formedness existed:

(15) Conceptualize the unit of meaning [GREAT/GREATER/INCREASED QUANTITY] as [GREAT/GREATER/INCREASED EXTENSION IN TIME] if it occurs in conjunction with the unit of information [EVENT].

There is in fact some independent justification for such a rule. Botha (1988:110) proposes a rule which differs only in technical details from the rule (15) as part of his analysis of Afrikaans reduplications.[22] The claim that an event was extended in time entails that this event was extended over more than one point in time. It thus seems reason-

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able to assume that the meaning representations of the sentences in (14) contain the units of information [EVENT, PUNCTUAL], as well as [EXTENDED OVER MORE THAN ONE POINT IN TIME]. Consequently, rule (7) will apply to derive the obligatory interative interpretation of these sentences. The fact that rule (7) can account for the obligatory iterative interpretation of such sentences, even though the link between the form of the sentences and their meaning representations is "less direct" than it is in the other cases discussed above, provides further support for the proposed account of the obligatory iterativity of punctual event expressions.

4.6 Repetitions of the verb

Consider the following sentences, which both refer to a punctual situation, and which both contain a repetition of the verb.

(16) (a) John sneezed and sneezed.
(b) The light flashed and flashed.

Quirk et al. (1972:619) point out that English sentences such as those in (16) must have an iterative interpretation.[23] The question arises whether rule (7) has any role to play in accounting for the iterative interpretation of these sentences. That is, the question arises whether there is any connection between the obligatory iterative interpretation of the sentences in (16) and that of the sentences discussed in par. 4.1-4.5 above. A complete analysis of sentences with repetitions of identical elements falls outside the scope of the present study. However, I will present the outline of an analysis that has some initial plausibility, and that makes it possible to account for the obligatory iterativity of the sentences in (16) in terms of the rule of conceptual well-formedness (7). As in the case of sentences with indefinite

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quantity expressions, the argument for the claim that the meaning representations of the sentences concerned contain the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] will be more complex than in the case of, e.g., sentences containing a durational adverbial.

Suppose that for English the basic meaning of any repeated construction is specified by the following rule relating form and meaning (thus, a correspondence rule):

(17) Interpret [α_i (*and* α_i)*] as [A INCREASED]

(where A represents the sense or meaning of α and INCREASED represents an abstract semantic unit, and where * indicates that the material enclosed may be repeated any number of times).

This rule can, in conjunction with a number of independently required rules of conceptual well-formedness, account for the interpretation of a wide range of repeated constructions. For instance, rule (17), in conjunction with the rule presented in (18), can account for the fact that the repetition of the comparative adverb *bigger* in (19) expresses intensification, that is, a continuing increase in degree. The only additional assumption that is required, is that the meaning of the adverb must contain the unit of meaning [VARIABLE/GRADABLE QUALITY].[24]

(18) Conceptualize [INCREASED] as [INCREASED IN INTENSITY]/[INTENSIFIED] if it occurs in conjunction with the semantic unit [VARIABLE/ GRADABLE QUALITY].

(19) Her eyes got bigger and bigger.

Similarly, rule (17), in conjunction with the rules (20) and

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(21), can account for the interpretation of the repeated noun in (22).[25]

(20) Conceptualize [INCREASED] as [INCREASED IN NUMBER] if it occurs in conjunction with the semantic specification [COUNTABLE THING].

(21) Conceptualize [INCREASED IN NUMBER] and [MORE THAN ONE] jointly as [CONSIDERABLE NUMBER] or [MANY].

(22) John drank bottles and bottles of juice.

The repeated noun in (22) refers to a countable object, and it can thus be assumed that the meaning representation of this noun will include the unit of meaning [COUNTABLE THING], triggering rule (20). The plural affix *-s* contributes the further unit [MORE THAN ONE] to the meaning representation associated with the sentence in (22), thus triggering rule (21).[26]

There is then some evidence to support the claim that rule (17) specifies the "core" or "basic" meaning of repetitions in English. Let us now consider whether rule (17), together with rule (7), can account for the obligatory iterative interpretation of the sentences in (16) above. Rule (17) will introduce the unit of meaning [INCREASED] into the conceptual structure associated with these sentences. This structure will in addition contain the units [EVENT] and [PUNCTUAL]. Rule (16) will apply to introduce the unit [INCREASED EXTENSION IN TIME], from which the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME] can be inferred. The conceptual structures associated with the sentences in (16) will thus contain the units [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME]. Consequently, rule (7) will apply to account for the obligatory iterative interpretation of the sentences in question.

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4.7 A possible explanation for some ill-formed sentences

Reference was made in par. 1 above to the fact that the addition of a frequency adverbial to punctual event expressions (and in fact to all other event expressions) leads to an obligatory iterative interpretation. There are, however, some restrictions on the co-occurrence of punctual event expressions with lexical material explicitly expressing iterativity. Consider for instance the unacceptability of the following sentences, which all contain a punctual event expression combined with a frequency adverbial:

(23) (a) *John died twice.
(b) *John was shot dead repeatedly.
(c) *This bomb exploded repeatedly.

The punctual events referred to in (23) have in common an element of finality, which prevents them from being repeated. To put it differently, these events involve a change which cannot become "undone" so that the same change can take place a second time. To put it yet another way, once these changes have taken place, the world cannot be "reset" to the state in which it was prior to the change.[27] Let us assume that in the conceptual structures associated with these expressions there is a unit of information [NON-RESETTABLE], which represents the information that the event referred to is final, in the sense that it cannot be reset.[28] The following rule of conceptual well-formedness can then be formulated to account for the unacceptability of the sentences in (23), where the unit [NON-ITERATIVE] formally marks an obligatory semelfactive interpretation.

(24) Conceptualize the unit of information [*EVENT*] as [NON-ITERATIVE] if it occurs in conjunction with the unit of meaning [NON-RESETTABLE].

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Rule (24) can account for the unacceptability of the sentences in (23) if one assumes (i) that the co-occurrence of the units of information [ITERATIVE] and [NON-ITERATIVE] in a conceptual structure representing a single event results in a conceptual structure which is internally contradictory, and (ii) that well-formed conceptual structures do not contain internal contradictions.[29]

The question now arises what happens when non-resettable punctual expressions appear in sentence contexts which are not explicitly iterative, but which are nevertheless obligatorily iterative due to the application of rule (7). The system of rules proposed above predicts that such sentences will also be unacceptable, since the conceptual structures associated with them will be internally contradictory. These representations will contain the unit [NON-ITERATIVE] --- due to the application of rule (24) --- and the unit [ITERATIVE] --- due to the application of rule (7). And indeed, when punctual event expressions referring to non-resettable events appear in the sentence contexts discussed above, the result is an unacceptable sentence. Consider for instance the unacceptability of the following examples.

(25) (a) *The bomb exploded for two days.
(b) *The bomb started to explode at nine o'clock.
(c) *John died more than Peter did.
(d) *John killed and killed Peter.

Thus rule (7), in conjunction with rule (24), can also account for the unacceptability of a wide range of sentences referring to punctual events. This provides further justification for rule (7).

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4.8 Summary

It was argued above that a single rule of conceptual well-formedness, rule (7), can account for the fact that punctual event expressions have an obligatory iterative interpretation in a wide range of English sentences which contain no lexical or grammatical marker of iterativity. The crucial assumption in each instance is that the conceptual structure associated with the sentence contains the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] in addition to the units [EVENT] and [PUNCTUAL]. In some instances the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME] can plausibly be argued to be added to the conceptual structure by the correspondence rules which associate a conceptual structure with the syntactic and lexical structure of the sentence. In other instances the relevant unit of information can be derived by means of (an) inference rule(s), plus possibly some further rules of conceptual well-formedness, from the conceptual structure assigned to the sentence by the correspondence rules. Given this account of obligatory iterativity rule (7), in conjunction with rule (24), can also account for the fact that some punctual event expressions cannot appear in the constructions discussed above. Rule (24) is independently required to account for the unacceptability of sentences containing certain punctual event expressions and lexical material explicitly expressing iterativity.

The proposed theory thus provides a principled explanation for the obligatory iterative interpretation of punctual event expressions over a wide range of English sentences. Moreover, this theory also makes some interesting predictions about obligatory iterativity in languages other than English, given that rules of conceptual well-formedness are supposed to be universal. The theory predicts that for all languages, if the meaning representation of a sentence contains the units [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME], the sentence will have an obligatory iterative interpretation.[30]

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Consider for instance the Dutch sentence in (26a) and the Afrikaans sentence in (26b). Both these sentences contain a durational adverbial (which is underlined) combined with a punctual event expression.

(26) (a) Jan overhandigde een uurlang een speld aan Peter.[31]
"Jan handed out a pin to Peter for an hour."

(b) Jan het vir twee dae lank gehoes.
"Jan coughed for two days."

Both these sentences, like their English counterparts, have an obligatory iterative interpretation. The arguments provided above for the claim that the meaning representations of the English equivalents of (26) contain the units [EVENT, PUNCTUAL, EXTENDED OVER MORE THAN ONE POINT IN TIME] also apply to these sentences. Consequently, the meaning representations of the sentences in (26) will contain the combination of units of information which triggers the application of rule (7). Given that rule (7) is not language-specific, but universal, the obligatory iterative interpretation of these Ducth and Afrikaans sentences can thus be explained by it. As pointed out by Platzack (1979:128ff.), Swedisch sentences in which punctual event expressions are combined with durational adverbials which express the information "for a time", are also obligatorily iterative. Rule (7) can explain the obligatory iterativity of such sentences too.

The fact that rule (7) correctly predicts the obligatory iterativity of the Dutch and Afrikaans sentences in (26), as well as that of the Swedish equivalents discussed by Platzack (1979:128ff.), provides further support for the basic claim on which the proposed analysis is based, namely, that the obligatory iterativity of the English sentences discussed above is is not the result of some language specific peculiarity of certain English expressions, but follows from a general, possibly universal principle of conceptual struc-

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ture. Of course, a full scale inquiry into the cross-linguistic validity of the proposed rule of conceptual well-formedness would require that a great deal of data from a variety of languages be considered. The fact that the proposed rule manages to account for the cross-linguistic generalization illustrated in (26) above suggests that it may indeed be worthwhile to undertake such an inquiry.

5 The optional iterative interpretation of unbounded event expressions

5.1 No rule of conceptual well-formedness for unbounded event expressions

As was illustrated with (3b) above, the addition of a durational adverbial to a sentence containing an unbounded event expression does not lead to an obligatory iterative interpretation for the sentence. In (27) below some more examples of such sentences are presented, with the durational adverbials underlined.

(27) (a) John slept in my room <u>for two hours/for two years</u>.
(b) John walked on the beach <u>for ten minutes/for ten years</u>.
(c) Mary baked cup cakes <u>for three hours/for three weeks</u>.

All these sentences can have either an iterative or a semelfactive interpretation. That is, they are only optionally iterative. Knowledge of the world appears to be the main factor which determines whether a sentence containing an unbounded event expression plus a durational adverbial will have an iterative or a semelfactive interpretation. Generally speaking, the shorter the period of time mentioned in the durational adverbial, the more likely it is that a semelfactive interpretation will arise. The longer the period of time mentioned, the more likely it is

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that an iterative interpretation will arise. In contrast with punctual event expressions, the co-occurrence of an unbounded expression with a durational adverbial thus does not rule out a semelfactive interpretation.

Formally, the possibility of two interpretations for sentences containing unbounded event expressions combined with durational adverbials can be accounted for in a straightforward manner. The first component in the solution is the assumption --- already made above --- that the meaning representations assigned to sentences containing event expressions by the correspondence rules are unspecified with respect to the iterative/semelfactive distinction. Given this assumption, no additional mechanisms are required to account for the possibility of two interpretations in the case of sentences such as (1). The second assumption necessary to account for the existence of two possible interpretations for sentences such as those in (27) --- i.e., sentences containing unbounded expressions combined with *for x time* durational adverbials --- is that there is no rule for unbounded event expressions analogous to rule (7) for punctual event expressions. That is, there is no rule of conceptual well-formedness which necessitates the presence of the unit of information [ITERATIVE] or the unit [NON-ITERATIVE] in a conceptual structure containing the units of information [EVENT], [UNBOUNDED], and [EXTENDED OVER MORE THAN ONE POINT IN TIME]. The mere absence of such a rule will automatically account for the fact that the sentences in (27) have two possible interpretations.[32] What is further needed, is the assumption that knowledge of the world can interact with knowledge of the "linguistic" meaning of these sentences, in order to determine their interpretation in specific contexts as either iterative or semelfactive.[33]

The possibility of two interpretations for sentences such as those in (27) reflects our normal conception of the distribution over time of events which have no distinctive points which individuate them. Normally we take it to be the case that an unbounded event obtained for a period of time, irre-

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spective of whether the event obtained uninterruptedly for the whole period of time mentioned, or whether discrete occurrences of the event were distributed over the period of time.[34] It is interesting to note that the distinction between a single, but interrupted, occurrence of an unbounded event and more than one distinct occurrence of such an event is in any case somewhat vague. Consider, for instance, the situation of someone practising the piano. Suppose that some individual practised for one hour every day of the week. In response to a question as to how many times he/she had practised during a week, the answer would be seven times. Suppose, in contrast, that there was one day on which the individual practised for several hours, but that the hours of practising were interspersed with short periods during which he/she did not actually sit at the piano, but drank tea, answered the doorbell, had lunch, etc. Did this individual practise once, or more than once, during the day in question? The answer to this is not clear-cut. Knowledge of the world plays an important role in decisions as to whether we are dealing with one or more than one occurrence of the unbounded event in such circumstances.[35]

The proposed account of the interpretation possibilities of sentences such as those in (27) makes a strong prediction about the interpretation of sentences in which unbounded event expressions are combined with the various elements discussed in par. 4. Specifically, this account predicts that all such sentences will have both an iterative and a semelfactive interpretation, since there is no rule of conceptual well-formedness which will force an iterative interpretation. This prediction is correct. That is, if the punctual event expressions in the sentences in par. 4.1-4.6 are replaced by unbounded event expressions, the resultant sentences can have either an iterative or a semelfactive interpretation, depending on the (linguistic or non-linguistic) context. There is, however, a complication. Unless there are explicit indications in the linguistic or non-linguistic context that an iterative interpretation is more plausible than a semelfac-

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tive interpretation, such sentences are normally assigned a semelfactive interpretation. This complication is discussed in par. 5.2 below.

5.2 The principle of maximizing temporal information

In the examples of sentences containing unbounded event expressions combined with *for x time* durational adverbials presented above, the period of time over which the situation was extended was specified in terms of some standardized unit of time, i.e., hours, days, months, etc. It was argued that in the case of such sentences it is primarily our knowledge of the world which determines whether a specific sentence will have an iterative or a semelfactive interpretation. Not all durational adverbials specify the period of time over which the event is extended in terms of such standardized units of time. Consider for instance the underlined durational adverbials in the following sentences.

(28) (a) John jogged for longer than Peter did.
(b) John played the piano for longer than he sang.

The theory proposed above predicts that such sentences will have both an iterative and a semelfactive interpretation. This prediction is correct in that, given the right context, any of these sentences can have either an iterative or a semelfactive interpretation. The possibility of a semelfactive interpretation needs no illustration. This is the normal interpretation when sentences such as those in (28) are interpreted in isolation. As regards the iterative interpretation, such an interpretation becomes more plausible than the semelfactive interpretation if (28a) is followed by a remark to the effect that Peter only jogged for one year, and (28b) by a remark to the effect that John only started singing in 1985. The interpretation of the sentences in (28) gives rise to the

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following question: Why is the semelfactive interpretation the normal, or preferred, interpretation unless there are explicit indications in the context that a semelfactive interpretation is less plausible than an iterative interpretation? The preference for a semelfactive interpretation for such sentences *in isolation does not* follow from any of the principles set out above. The fact that sentences such as those in (28) are given a semelfactive interpretation unless there are indications to the contrary requires some explanation, given the assumption that the semantic representations of such sentences are neutral with respect to the iterative/semelfactive distinction.

The pattern of interpretation for unbounded event expressions illustrated above with reference to sentences containing durational adverbials also occurs with all the other elements discussed above. In (29) below unbounded event expressions are combined with lexical material expressing the information that the event referred to continued through time.

(29) (a) John kept on jogging.
(b) Sue continued playing the piano.

When interpreted in isolation, the sentences in (29) are normally assigned a semelfactive interpretation. However, these sentences can also have an iterative interpretation. For instance, if (29a) is expanded as follows, an iterative interpretation is more plausible than a semelfactive interpretation:

(30) In spite of the fact that X-rays had revealed extensive damage to his knee, John kept on jogging.

The same is true for sentences such as those in (31), where an unbounded event expression is embedded under an aspectual verb. Note that the adverbial in (31) is of such a nature that it contains no information which would favour one or the other

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interpretation, yet a semelfactive interpretation is the natural interpretation.

(31) John started to sing earlier than Peter did.

In a suitable context, unbounded expressions embedded under aspectual verbs can also have an iterative interpretation. For instance, an iterative interpretation is more plausible than a semelfactive interpretation for (32).

(32) John started to sing in 1985.

In (33) unbounded event expressions co-occur with indefinite quantity expressions.

(33) (a) John played the piano more than he played the organ.
(b) John swam a lot.
(c) John swam more than Peter did.

If one puts aside for the moment the fact that the expression *more* in (33a, c) can be interpreted as an abbreviation for *more times*, then it becomes clear that these sentences too can have both an iterative and a semelfactive interpretation. Moreover, unless there are indications to the contrary, a sentence such as (33b) is normally interpreted to refer to the duration of John's swimming, rather than to the number of times that he swam.

When interpreted in isolation, sentences which contain a repetition of the verb of an unbounded event expression, also have a semelfactive interpretation.

(34) (a) John ate and ate.
(b) The children swam and swam.

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However, in the right context such sentences can also have an iterative interpretation. Consider for instance the following exchange.

(35) A : What did you do during the holidays?
B : Oh, we swam and swam and read and read!

B's reply is not interpreted to refer to a holiday during which the speaker swam continuously for a stretch of time and then read continuously for a stretch of time. Rather, it is interpreted to refer to a holiday during which the speaker swam and read repeatedly (with the implicature that (s)he did those things to the exclusion of anything else worth mentioning).

The pattern of interpretation for unbounded event expressions illustrated above is even more general than was suggested above. Note, for instance, that it also applies to the interpretation of both the sentences in (1). This pattern of interpretation (amongst others) forms the topic of Smith's (1977) article on the interpretation of sentences with incomplete temporal information. Smith (1977) considers various respects in which the temporal information contained in sentences is incomplete. So, for instance, she (1977:568ff.) considers the interpretation of the following two sentences:

(36) (a) Reuben worked in the garden.
(b) Cousin Judith fed the cat.

As is noted by Smith, these sentences may have either a semelfactive or an iterative interpretation.[36] Smith claims that in their iterative interpretation these sentences are incomplete, in that they lack a frequency adverbial and a specification of the reference time interval (i.e., the interval of time which is being referred to).

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Although sentences such as those in (36) can have both an iterative and a semelfactive interpretation, they are normally given a semelfactive interpretation when interpreted in isolation. Smith (1977:571) claims that when presented in isolation (i.e., not embedded in a linguistic or non-linguistic context), such sentences are interpreted in accordance with the following principle:

(37) "Associate with a sentence the temporal interpretation that requires the least additional information".

The semelfactive interpretation of sentences such as those presented in (36) in isolation requires less additional information than an iterative interpretation, given the absence of a frequency adverbial and a specification of the reference time interval. Smith (1977:571-2) comments as follows on the circumstances in which the interpretation requiring the least additional information will be made:

(38) "They [including a semelfactive rather than an iterative interpretation for sentences such as (36) --- M.S.] are the common interpretation for sentences in isolation, in the absence of particular information in the sentence that makes a certain reading implausible, or of a particular experience that someone interpreting the sentence might have. In other words, I am not saying that people will always give these interpretations [including a semelfactive rather than an iterative interpretation --- M.S.], but rather that they will give them in the absence of other information".

The sentence in (39) below is one of the sentences discussed by Smith (1977:572) to illustrate the role of "other information" in making an iterative interpretation more plausible than a semelfactive interpretation.

(39) Mrs. Starkadder ate breakfast last month.

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The reference time in this sentence is a longish interval, namely a month. This cannot plausibly be matched with a single instance of the event in question, namely, eating breakfast. Consequently, an iterative interpretation is preferred.[37]

Note that the obligatory iterative interpretation of the sentences with punctual event expressions discussed in par. 4 does not constitute counterevidence for Smith's claim about the role of the principle of maximizing temporal information in the interpretation of temporally incomplete sentences. In the case of the sentences discussed in par. 4 the information that the situation referred to was repeated, is added to the conceptual structure associated with the sentence by a rule of conceptual well-formedness.

The relevance of Smith's principle of maximizing temporal information for the iterative/semelfactive interpretation of sentences referring to unbounded events given above should be clear. This principle can explain why such sentences normally have a semelfactive interpretation unless there are explicit indications in the (linguistic or non-linguistic) context which make a semelfactive interpretation less plausible than an iterative interpretation. The role of knowledge of the world in swinging the scales in favour of an iterative interpretation for some of the sentences in (3b) and (27)-(35) above provides an illustration of how other considerations can, as it were, overrule the interpretation yielded by the principle of maximizing temporal information.

5.3 Summary

In sum: The theoretical principles adopted above make the correct predictions about the interpretation of English sentences in which unbounded event expressions co-occur with

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(i) durational adverbials, (ii) lexical material expressing the notion that the event referred to continued through time, (iii) aspectual verbs such as *start*, *stop*, (iv) indefinite quantity expressions, and (v) repetitions of the verb. Given that there is no rule of conceptual well-formedness for unbounded event expressions analogous to rule (7), it is predicted that all such sentences can in principle have both an iterative and a semelfactive interpretation. The independently justified principle of maximizing temporal information can explain why, in the absence of considerations pointing to an iterative interpretation, a semelfactive interpretation rather than an iterative interpretation will be given. As argued above, knowledge of the world plays a key role in determining the interpretation of specific instances of sentences containing unbounded event expressions, since it is partly on the basis of such knowledge that the (im)plausibility of a particular interpretation must be determined.

The proposed account of the iterative/semelfactive interpretation of unbounded event expressions has obvious cross-linguistic consequences. Given the universal status of rules of conceptual well-formedness, one would expect that in languages other than English, also, there would be no rule forcing an obligatory iterative or semelfactive interpretation for unbounded event expressions (unless, of course, these expressions are combined with lexical or grammatical markers of iterativity or semelfactivity). Moreover, given the general nature of the principle of maximizing temporal information, one would expect a preference for a semelfactive interpretation in other languages too.

The iterative/semelfactive interpretation of unbounded event expressions has received much less attention in the literature than that of punctual and bounded event expressions. Nevertheless, two considerations that provide some initial evidence for the claim that the pattern of interpretation for unbounded event expressions set out above is not language-

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specific, can be mentioned here. Firstly, the pattern of interpretation described by Platzack for Swedish unbounded event expressions is similar to the pattern described above for English unbounded event expressions. Thus, according to Platzack (1979:130), unbounded event expressions such as *han löste* "he read" are given a plural (= that is, an iterative) interpretation only if there is "a pointer to this sense somewhere in the sentence ... or eventually in the wider context". Secondly, a preliminary investigation indicates that the pattern of interpretation of the Afrikaans equivalents of the English sentences discussed in par. 5.1-5.4 is in the relevant respects identical to the pattern of interpretation of the English sentences. For example, both the Afrikaans sentences in (40) will have a semelfactive interpretation, unless there are indications in the linguistic or non-linguistic context that an iterative interpretation is more plausible than a semelfactive interpretation.

(40) (a) Jan het vir 'n lang ruk klavier gespeel.
"Jan played the piano for a long time."

(b) Jan het aangehou met draf.
"Jan kept on jogging."

6 Conclusions and questions

The account of optional and obligatory iterativity proposed here is based on the assumption that the iterative or semelfactive interpretation of sentences is not determined exclusively by construction-specific, or even language-specific, principles of meaning. Rather, it is determined by the interaction of language-specific principles of meaning with universal principles of conceptual structure. The reliance on universal principles of conceptual structure in an account of optional vs. obligatory iterativity has two attractive consequences. Firstly, the proposed theory can provide a principled answer to the question of why a wide range of

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sentences in a specific language --- English in this case --- all have either an optional or an obligatory iterative interpretation. Secondly, it seems as if the theory has the potential to account for certain cross-linguistic generalizations regarding iterativity. Of course, in order to test the cross-linguistic predictions of the theory properly, much more data from languages related to English, as well as from non-related languages, are required.[38]

One of the most pressing questions raised by the account of iterativity presented above, is whether the obligatory iterativity of other types of event expressions can also be accounted for in terms of rules of conceptual well-formedness. Consider, for instance, the interpretation of the following two sentences, which refer to the bounded event of John's drawing a small circle with his new pen.

(41) (a) For two hours John drew a small circle with his new pen.

(b) John started to draw a small circle/drawing a small circle with his new pen.

(41a) has an obligatory iterative interpretation, while (41b) can have either an iterative or a semelfactive interpretation. Bounded event expressions thus seem to pattern partly like punctual event expressions and partly like unbounded event expressions with respect to the iterative/semelfactive distinction. Consequently rule (7), which can account for the obligatory iterativity of punctual event expressions, cannot simply be extended to account for the obligatory iterativity of bounded event expressions.

One difference between the event expressions in (41a) and (41b) lies in the aspect of the verb. In (41a) the verb is marked for the so-called perfective aspect, while in (41b) the verb is either unmarked for aspect ("to draw a small circle with his new pen") or marked for imperfective aspect

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("drawing a small circle with his new pen"). According to Comrie (1976:12), the perfective denotes "a situation in its entirety, without regard to internal temporal constituency". He (1976:21) also states that "perfectivity involves lack of explicit reference to the internal temporal constituency of a situation, rather than explicitly implying the lack of such internal temporal constituency". Imperfectivity, in contrast, involves "explicit reference to the internal temporal constituency of a situation, viewing a situation from within ... " (Comrie 1976:24).

If these characterizations of perfectivity and imperfectivity do indeed apply to the English sentences under discussion, a possible solution to the problem of accounting for the contrast between optional and obligatory iterativity in sentences containing bounded event expressions, such as the sentences in (41), suggests itself. If a bounded event is referred to in its entirety, without regard to its internal temporal constituency, then the information that the event was extended over a period of time cannot be interpreted to refer to the distribution of the subcomponents of this event over time. Rather, it can only be interpreted to refer to the distribution of the event as a whole over the period of time in question. That is, it must be interpreted to refer to the distribution of more than one instance of this event over the period of time. Hence, an obligatory iterative interpretation for sentences such as (41a) will result. If, on the other hand, a bounded event is not presented in its entirety, but is, for example, "viewed as from within", the information that the event was extended over a period of time can be interpreted to refer either to the distribution of the event as a whole over this period of time, or to the distribution of subcomponents of this event over the period of time. In cases such as (41b), the addition of the information that the event was extended over time to the information contained in a bounded event expression will then not lead to an obligatory iterative interpretation.[39]

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It thus seems possible to account for the obligatory iterativity of bounded event expressions in terms of a rule of conceptual well-formedness, provided that the contribution made by the aspect of the verb to the meaning representation of a sentence is taken into account. These remarks on the role of aspect in an account of the optional or obligatory iterativity of bounded event expressions are, however, highly speculative, and many nontrivial questions remain to be answered.

In a more extensive account of the iterative vs. semelfactive interpretation of event expressions, the question of the proper classification of event types will also have to be dealt with. Are there, for instance, only three event types --- punctual, unbounded, and bounded? Or does a more fine-grained classification underlie our conceptualization of events? In most studies it is assumed that there are only three event types, but Lys and Mommer (1986) propose a classification schema with six different types of events, based on the temporal properties of events. It is an empirical question how many different event types must be distinguished in order to account for optional and obligatory iterativity across the full range of event expressions. Also, one would have to determine whether the classification required for an account of iterativity has reflexes in other areas of meaning too.

A last point: Jackendoff (1983:247) refers to the view that "the two ontological categories [THING] and [EVENT] share some of the same possibilities for internal structure".[40] This raises the question of whether rule (7) --- which accounts for the obligatory iterativity of punctual event expressions --- is but a special case of a more general principle that applies to event expressions as well as to "thing expressions". Just as there are punctual events --- i.e., temporal entities which are conceived of as having the extension in time of a point --- there are physical entities which are conceived of as having the extension in space of a point.[41] For instance, a speck of dust is nor-

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mally conceptualized as having the extension in space of a point. The information that such an entity is extended over an area --- i.e., over more than one point in space --- can be meaningfully interpreted only if it is assumed that there is more than one instance of the entity distributed over the area in question. Consider the interpretation of the sentences in (42), both of which contain a noun phrase referring to a "punctual" physical entity together with lexical material expressing the information that the entity referred to is extended in space.

(42) (a) The whole are was covered with specks of dust.

(b) The whole apple was covered with a brownish speck.

The obligatory plural interpretation of the underlined noun phrase in (42a) --- which parallels the obligatory iterative interpretation of punctual event expressions in sentences such as (3a) --- is reflected by the plural form of the noun phrase. Even when the noun phrase is not marked for plurality --- as in (42b) --- it is still interpreted to refer to more than one instance of the thing in question.

The observed parallelism between the obligatory iterativity of punctual event expressions and the obligatory plurality of punctual thing expressions, provides some support for the view that similar principles underlie our conceptualization of events and things. The interesting question, of course, is: What is the extent of this similarity?

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NOTES

1. According to Comrie (1976:27), a sentence has a **semelfactive** interpretation if it can be interpreted to refer to a single occurrence of the relevant event. Comrie, following standard practice, contrasts semelfactivity with iterativity. A sentence has an **iterative** interpretation if it can be interpreted to refer to a repetition of the situation referred to by the sentence, i.e., to the successive occurrence of several instances of the given situation. The term "iterative" is used with other meanings too. Comrie (1976:27, fn. 1) refers to the use of this term in Slavonic linguistics to refer specifically to habitual forms. Cf. also Kučera 1981:179, where the Czech infix *-va-* is analysed. This infix is called a marker of iterativity, but occurs in sentences which do not denote repetition, recurrence, or successiveness. The term "iterative" is commonly used in the literature as a cover term for any sentence meaning which includes the notion of repetition. There are, however, authors who use the term "repetitive" as the general term, while reserving "iterative" to refer to consecutive repetition. The latter type of repetition is then distinguished from repetition spread out over time, as in the case of habituals. Cf. e.g. Lys and Mommer 1986. The term "iterative", and its morphologically related forms, will be used below to refer to any situation which is understood to take place more than once, irrespective of how the repetitions are distributed through time.

2. In (3b) the length of the period of time referred to by the durational adverbial is the main factor which determines whether the sentence will be given an iterative or a semelfactive interpretation. If the period of time explicitly referred to in (3a) becomes too short for one to be able to conceive of the situation as being repeated

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in that period of time, the sentence either becomes unacceptable, or the conceptualization of the event changes in a way that will be explicated in par. 4.1 below. Cf. also fn. 8 below in this connection.

3. Cf. e.g., Daalder 1974:8, Platzack 1979:129, Smith 1977: 568ff in this connection. The notion 'event expression' is explicated in par. 3 below.

4. In addition to the studies referred to below in the text, cf. also Dowty 1979; Langacker 1982; Mittwoch 1982, and several of the contributions in De Groot and Tommola (eds.) 1984 and Tedeschi and Zaenen (eds.) 1981.

5. In the terminology of Jackendoff (1987b:398), punctual events are those associated with a point in time, and unbounded events are associated with a region in time, unbounded at either end by a point in time. Following Vendler (1967), a further distinction is commonly made between bounded events and states. For instance, such a four-fold distinction forms the basis of Platzack's (1979:chapter 5) account of obligatory vs. optional iterativity in Swedish. Lys and Mommer (1986) employ a different classificatory scheme, in which six different event types are distinguished. It is an empirical issue what system of event types is required to account for obligatory vs. optional iterativity across the full spectrum of event expressions.

6. The summary presented here is mainly based on Jackendoff's (1987a:97-98) account of the leading points of Conceptual Semantics. (Jackendoff 1983) contains the most extensive explication of the fundamental assumptions and formal mechanisms of Conceptual Semantics. Cf. also Jackendoff 1987b for more details on this theory.

7. Jackendoff (1983:31) designates real-world entities without any special markings, and surrounds references to pro-

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jected-world entities by # # . Information contained in conceptual structures is designated by capitals.

8. Several authors have pointed out that certain events which are normally conceived of as being punctual do actually have very brief duration. For instance, while the event of someone coughing once is normally conceived of as being punctual, in a slowed-down film context it can be seen that this event actually has duration. Cf. e.g., Comrie 1976:34; Mittwoch 1980:201; Declerck 1979: 733, 780, 790; Cochrane 1977:86; Talmy 1978:19 for some discussion of the difference between the normal, everyday conceptualization of certain events as punctual and their objectively measurable properties. They also discuss the interpretation of sentences containing event expressions which are normally taken to refer to punctual events in special contexts such as the slowed-down film context. The difference between our conceptualization of certain events as punctual and their "real world" properties provides an illustration of Jackendoff's claim that our conceptual structures contain information about the projected world, i.e., the world as experienced through the human mind, rather than the real world. Moreover, the possibility of a change in our conceptualization of punctual events, given different contexts, illustrates that the projected world is subject to change, given new experience.

9. No attempt will be made here to formulate the rules which are responsible for assigning the relevant conceptual structures to the sentences in question. Arguments will only be presented to the effect that the structures must contain certain elements. Another issue which will not be considered in detail here, is the precise nature of the internal organization of the conceptual structures. In the cases under discussion, it will be assumed that the internal organization of the representations are such that it is clear that the units [EVENT] and [PUNCTUAL]/

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[UNBOUNDED] jointly characterize one conceived entity.

Note that Jackendoff (1987b:298-9) provides a formalism for the representation of information about the temporal properties of events that differs somewhat from the one used here. The system of representation employed in the text has the advantage that it is much easier to handle typographically. At least as far as the iterative/semelfactive interpretation of the sentences discussed in the text is concerned, the two systems of representation seem equivalent. Of course, further inquiry may show that the two systems are not equivalent, and that the more complex system proposed by Jackendoff is required for an adequate representation of information about the temporal properties of events.

10. The (a) sentence is to some extent odd, since we do not normally provide such detailed temporal information on the occurrence of events such as sneezing. However, this oddity is clearly pragmatic in nature, and it does not invalidate the point that punctual expressions can be combined with temporal adverbials referring to unique points in time.

Lys and Mommer (1986:222) point out that when durative event expressions are combined with a point-in-time adverbial, the sentence can also be interpreted with the specified point in time coinciding with the starting point of the process. In the case of (6b) this interpretation is not available.

11. The precise nature of the distinction between bounded and unbounded events, and between bounded and unbounded event expressions, is subject to a great deal of controversy, which cannot be unravelled here. It is sufficient to note that the notion 'unbounded' employed here correlates with the notion employed by Jackendoff (1987b:396-9).

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Another issue which cannot be considered here, is the precise relation between the type of event referred to by a sentence and the form of the sentence. This link is by no means simple. The verb is widely assumed to play a central role in determining the nature of the event referred to. For instance, Vendler's (1967) classification, which forms the basis of much recent work on the event types, is a system of verb classification. However, various other elements in the sentence also play a role. Cf. Verkuyl 1972 for an early study of the role of constituents other than the verb in determining the event type referred to by a sentence. Cf. Declerck 1979 for a recent attempt to systematize the relation between forms of sentences and types of event expressions. Cf. also Lyn and Mommer's (1986) two-level approach to the problem of aspectual verb classification.

12. It is assumed here that a period of time is conceptualized as an ordered series of points in time. Miller and Johnson-Laird (1976:77) argue that, although time is a line, for psychological and linguistic purposes it is convenient to think of time as a sequence of moments. They refer to several psychological studies which provide evidence that time is indeed experienced in quantized moments.

13. Given that Jackendoff (1983:105; 1987a:97) assumes that there is no formal distinction between semantic and pragmatic inference, it is also immaterial whether the inference to the unit [EXTENDED OVER MORE THAN ONE POINT IN TIME] is based on purely semantic grounds, or whether pragmatic considerations play a role.

14. Cf. e.g., Declerk 1977:771 for a discussion of these adverbials. In addition to the interpretation noted in the text, such adverbials have two further interpretations, neither of which is relevant here. Firstly, the

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adverbials in (9) can, in addition to their use as answers to the question "For how long?", also be used as answers to the question "Within what time?". Normally, *in x time* durational adverbials co-occur with bounded event expressions, although punctual expressions can also co-occur with them. Cf. e.g., Mittwoch 1982: appendix and Dowty 1979:253 for the interpretation of such sentences. Secondly, some of these adverbials also have an interpretation in terms of which they merely locate a situation in some segment of the time line. For instance, a sentence such as *It has exploded since Wednesday* can be interpreted to mean that the explosion occurred at some point in time between Wednesday and the time of speech. Under this interpretation, the adverbial functions as a temporal adverbial, rather than a durational adverbial, and it does not add the unit of information [EXTENDED OVER MORE THAN ONE POINT IN TIME] to the meaning representations of the sentences in which it occurs. Cf. e.g., Declerck 1979:789 for some further discussion of temporal adverbials. Under the latter interpretation, rule (7) will not apply to the meaning representations of the sentences in which they occur, with the result that these sentences will only have an optional iterative interpretation.

15. Following Talmy (1978), Jackendoff (1987b:399) also refers to the possibility of "zooming in" on an event conceptualized as a point in time, so that from a closer perspective the event appears to occupy a bounded interval of time, rather than a point in time.

16. Note that (Jackendoff 1987b:399) claims that such expressions are in fact associated with a region of time bounded by a specific point in time. Since Jackendoff does not refer to bounded event expressions, it is not clear how he would distinguish between the temporal properties of bounded events and the type of punctual event which is also associated with a period of time. Lys and Mommer

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(1986) distinguish between (i) punctual events which are only associated with a moment in time --- e.g. to flash, (ii) bounded events, which consist of a period of time bounded by a point in time --- e.g. to cross a bridge, and (iii) punctual events which presuppose a period of time --- e.g. to win a race. In a more comprehensive account of the semantics of event expressions, the question of the various types of events that must be distinguished, as well as of the precise characterization of each type, will have to be considered in detail.

17. Cf. Mittwoch 1980:221ff for more detail on some of the complications that arise in connection with such "result state" sentences, e.g., problems regarding the class of verbs and the class of durationals that permit this interpretation.

18. The interaction between punctual event expressions, the English progressive and rule (7) must also be considered in any comprehensive account of the optional vs. obligatory interpretation of punctual event expressions. Compare the interpretation of the sentence in (i) with that of the sentence in (ii).

(i) John was sneezing.
(ii) John was arriving.

(i) refers to a punctual situation which does not presuppose a preceding durative stage. Under the present tense interpretation of the progressive, (i) usually has an iterative interpretation --- cf. Langacker 1982:282. However, (ii), which refers to a punctual event which is a so-called achievement, --- i.e., which presupposes a preceding durative stage --- cannot be so interpreted. (ii) is rather interpreted to refer to the durative stages leading up to the actual moment of arrival. An account of the difference in interpretation between (i) and (ii) presupposes an adequate theory of the English progressive, and the problem raised by the difference must thus be left unresolved here. Note, however, that the difference in

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interpretation between (i) and (ii) provides some support for the view that events such as a light flashing once should be distinguished from events such as someone reaching some place. As was noted above, Jackendoff (1987b:399) makes such a distinction. Lys and Mommer also (1986:219ff) make such a distinction. They distinguish between expressions denoting events that have only a so-called punctual nucleus (such as sneezing), and expressions such as *reach* which also refer to a single moment in time, but where this moment is the culmination point of a presupposed durative process.

19. Cf. e.g., Miller and Johnson-Laird 1976:444ff. for some discussion of such verbs.

20. In the case of punctual event expressions referring to a punctual event preceded by a presupposed durative process --- e.g., *to win a race* --- the punctual event expression can also be interpreted to refer to the durative process leading up to the actual punctual event. Under this durative interpretation of the event expression, embedding under an aspectual verb does not lead to obligatory iterativity.

21. Mittwoch (1982:116) also points out that with verbs such as *eat* and *read*, which can be used transitively, the meaning vacillates between duration/frequency and the amount of the understood object. Since the latter interpretation is not relevant for the present discussion, it will be ignored here.

22. Botha's rule is formulated as follows:

> Conceptualize [INCREASED] as [INCREASED IN TIME] if it occurs in conjunction with the semantic unit [TEMPORAL ACT/EVENT].

Apart from the obvious technical differences between the two rules --- e.g., the fact that Botha's rule refers

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to a unit [INCREASED IN TIME] while rule (15) refers to a unit [...INCREASED EXTENSION IN TIME] --- rule (15) is more general than Botha's rule. The important point for the purposes of the present analysis, however, is that both rules express the same basic idea, namely, that quantity in the case of events has to do with quantity in time.

23. Their example is *They knocked and knocked*. Note that sentences which refer to so-called achievements which have stages leading up to the actual punctual event apparently cannot appear in sentences with repeated verbs. For instance, the sentence *He reached and reached the summit* is unacceptable. This fact calls for an explanation, but for reasons of space the issue cannot be pursued here.

Platzack (1979:123) refers to an observation by Noreen that in Swedish too sentences such as those in (16) necessarily express iterativity. Platzack does not, however, make any proposal as to how the iterative interpretation of such sentences can be accounted for in terms of his analysis.

24. Botha (1988:116) employs rule (18) as part of his analysis of Afrikaans reduplications. In so far as rules of conceptual well-formedness are not meant to be language-specific, Botha's arguments for the rule in question thus provide some independent justification for it.

25. Note that Botha (1988:104) employs both these rules as part of his account of the meanings of Afrikaans reduplications. There is thus again some independent justification available for these rules.

26. Note that the interpretation of repeated noun phrases is in fact more complicated. Quirk et al. (1972:618) observes that when a noun is repeated "the effect may be to suggest that different types can be distinguished".

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For instance, the sentence *There are teachers and teachers* can be interpreted to mean that there are good and bad teachers. It is possible that this "different types" interpretation of repeated noun phrases can be explained as a conversational implicature of the use of these sentences. Cf. Levinson 1983:111 for an account of the interpretation of similar sentences in terms of the notion of conversational implicature.

27. Cf. Talmy 1978:19 for the notion of non-resettable situations.

28. Note that, given the lack of a formal semantics-pragmatics distinction, it is irrelevant for the purposes of the current analysis whether this unit is contributed by the lexical meaning of the sentence constituents, or whether it is added to the conceptual structure on the basis of our knowledge of the world.

29. Nothing crucially depends on the exact nature of the feature expressing semelfactivity. The choice of [NON-ITERATIVE] is convenient, in that it makes it possible to highlight the potentially contradictory nature of certain conceptual structures. The question of the relation between logical principles and principles of conceptual structures of the type considered here deserves further study. However, for the purposes of the present analysis I will simply make the very reasonable assumption that conceptual structures containing internal contradictions are not well-formed. This assumption does not entail that speakers will never actually associate structures which are internally contradictory with certain expressions, nor does it entail that speakers will always be aware that some conceptual structure associated with an expression contains an internal contradiction.

30. Note that it is not being claimed here that all languages will be exactly alike as regards the possibility of an

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iterative/semelfactive interpretation. The possibility of variation in the rules of conceptual well-formedness is one factor that could lead to differences across languages. Also, one would not expect parallel constructions in all languages.

31. This Dutch example is from (Verkuyl 1976:481).

32. Note that it is not being claimed that every instance of a sentence containing an unbounded event expression combined with a durational adverbial will always have two interpretations. As argued above, knowledge of the world can rule out one interpretation as implausible. The point being made here is rather that it is in principle possible for sentences of the relevant type to have two interpretations, although in practice only one of these possibilities may be realized.

33. An account of the interpretation of unbounded event expressions is complicated by the fact that event expressions which, in isolation, will be interpreted as unbounded can, in context, be given a bounded interpretation. For instance, the event expression *He jogged* is normally given an unbounded interpretation, but in a context where it is known that the individual referred to regularly jogged a fixed distance, this expression will be interpreted as a bounded event expression. For instance, one would be able to expand the expression with the adverbial *in less than half an hour*, where durational adverbials of the *in x time* type are normally restricted to bounded event expressions.

34. For instance, Bach (1981:74) suggests that durationals have the following truth condition: "for I,p (p a sentence,I an interval) is true just in case p is true at all (or sufficiently many scattered) subintervals of I" [the underlining is mine --- M.S.].

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35. Cf. e.g., Dowty 1979:54-55 and Bache 1982:65 for a discussion of what is involved in the individuation of unbounded situations. Bache, following Dowty, refers to the notion of 'relevant psychological moments' in an account of a durative vs. iterative interpretation of unbounded event expressions. Note that, in contrast with unbounded events, the distinction between a single or multiple occurrence of a punctual event is not fuzzy. This is also true for bounded events, which have definite terminating points which set these events apart from other events, including a further occurrence of the same event.

In the discussion above of the interpretation of sentences such as those in (27), two interpretations were distinguished: (i) the sentence is interpreted to refer to a single occurrence of the unbounded event *which obtained for the period of time mentioned* in the durational adverbial, or (ii) the sentence is interpreted to refer to several occurrences of the unbounded event which were distributed over the period of time mentioned in the adverbial. For at least some of the sentences there is, however, also a third possibility. Consider again the interpretation of *Mary baked cup cakes for three hours*. This would normally be interpreted to refer to a single occasion of cup cake baking which lasted for three hours. It could also, however, be interpreted to refer to more than one occasion of cup cake baking which lasted for three hours in total. For reasons of space the latter interpretation is not considered here.

36. Smith uses the term "habitual" to refer to the interpretation where reference is made to more than one occurrence of the situation in question. As was noted in fn. 1 above, the distinction between iterativity and habituality is not important for the present study. All that is relevant, is that habituality in cases such as those in (36) presupposes iterativity.

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37. Smith (1977:574ff) draws a parallel between the strategy of maximizing temporal information in the interpretation of sentences and strategies used in the interpretation of visual stimuli. She (1977:575) claims that the examples from the domain of visual interpretation presented by her provide support for her claim that the strategy of maximizing temporal information is a very general one, not confined to a single linguistic domain, namely, the interpretation of temporally incomplete sentences. Smith's claim about the similarity between the interpretation of visual stimuli and the interpretation of linguistic information fits in neatly with Jackendoff's (1983:19) claims about the analogies between judgments of visual and linguistic information.

38. An inquiry into the cross-linguistic consequences of the theory is complicated by the fact that language-specific factors may interact with the proposed principles, so that the patterns of interpretation across languages may not be exactly the same. To mention but one factor: Although rules of conceptual well-formedness are innate and universal, Jackendoff admits the possibility of differences across speakers and cultures, given different experience. In a reference to the sort of distinctions dealt with here, Bach (1981:79) states that, although they are probably universal, it is "not to say that the use they are put to or the reflexes we find are identical across languages". Cf. e.g., Smith 1987:121f. for an interesting difference between English and Chinese as regards the linguistic realization of events such as dying or winning a race.

39. In the absence of indications to the contrary, (41b) is normally assigned a semelfactive interpretation. This preference for a semelfactive interpretation follows from the principle of maximizing temporal information.

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40. Cf. also Talmy 1978:17ff. and Platzack 1979:79-81, and Lyons 1977:718ff. in this connection.

41. Cf. e.g., Talmy 1978:18 for some discussion of the similarities between events and things as regards their degree of extensionality.

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