

Two Theories of Action Sentences\*

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The philosopher Anthony Kenny (1963: 151-70) has noted that two important semantic problems are presented by the fact that sentences can contain a variable number of adverbial modifiers. Sentences (1)-(3) illustrate this variability for sentences containing the action verb stumbled.

- (1) John stumbled.
- (2) John stumbled in the park.
- (3) John stumbled in the park at noon.

The first problem Kenny notes applies only if we treat the adverbials that occur in sentences like (2) and (3) as arguments of the main verb, as is the case, for example, in Case Grammar (Fillmore 1968). This problem is that we shall have to represent stumbled as a one-place predicate in (1), as a two-place predicate in (2), and as a three-place predicate in (3). But, as Kenny notes, this is tantamount to claiming that stumbled is a different relation in each of the above sentences.

The second problem posed by data like (1)-(3) derives from the fact that (3) entails (1) and (2) and (2) entails (1). As Kenny notes, if we treat the adverbials that occur in (2) and (3) as arguments of the main verbs we shall be unable to account for these entailments unless we appeal to some novel semantic device or devices (say axioms or rules of inference) that have the effect of stripping stumbled of its adverbial arguments.

There exists an alternative theory of the adverbials that occur in sentences like (2) and (3) that solves the first of Kenny's problems, but not the second. This theory is usually referred to as the "higher sentences" theory of adverbials. According to George Lakoff (1970) a sentence like (3) is derived from an underlying structure something like (4).

- (4) (<sub>S</sub>At (<sub>S</sub>In (<sub>S</sub>Stumbled John<sub>S</sub>), the park<sub>S</sub>), noon<sub>S</sub>)

The "higher" sentences analysis of time and place adverbials clearly solves the first problem Kenny raises, for stumbled can uniformly be treated as a one-place predicate. On the other hand, this type of analysis cannot account for the entailment relations that we observed to obtain among the sentences (1)-(3) without appealing to some novel semantic device or devices that strip the

semantic representations underlying sentences like (2) and (3) of their higher sentences.

I would like to turn now to consider two alternative analyses of sentences containing time and place adverbials which are designed in part to solve both of Kenny's problems. The first is an analysis of action sentences advanced by Donald Davidson (1967, 1969) and recently defended by Gilbert Harman (1972). The second is a more general analysis of sentences containing time and place adverbials first advanced by me at the 1973 winter meeting of the LSA (M. Geis 1974a).

Davidson takes the position that action sentences refer to actions (which he takes to be a species of events) in something like the sense that ordinary concrete noun phrases refer to material objects. He further argues that time and place adverbs are not verb modifiers but are, instead, predicates of the actions that action verbs describe. As Davidson notes, action sentences do not contain a term in surface structure that makes reference to the actions described or which time and place adverbs could be construed as predicates of. His proposal is that we provide such a term in the logical forms of action sentences which, within the framework of a transformational grammar, could be said to be obligatorily deleted.<sup>1</sup>

Returning to the examples with which we began, Davidson would provide (5) as the logical form for (3).

- (5)  $(\exists x) ((\text{Stumbled}(\text{John}, x) \ \& \ \text{In}(x, \text{park})) \ \& \ \text{At}(x, \text{noon}))$

It should be clear that Davidson's analysis solves both of the problems that Kenny has raised insofar as they concern time and place adverbials. The verb stumbled will be treated uniformly as a two-place predicate in the representations of (1)-(3), and the fact that (3) entails both (1) and (2) can be accounted for without appeal to novel semantic devices. As a result, Davidson's analysis has a clear semantic edge over both the verb-modifier and "higher sentence" analyses of time and place adverbials. The question must be asked, however, whether Davidson's analysis of action sentences can be motivated on syntactic grounds. Davidson has given one clear case of a syntactic argument for his analysis and Harman, who contends that Davidson's analysis is compatible with what is known of English syntax, has provided a sample transformational derivation. In what follows, I show that Davidson's syntactic argument is faulty, and that Harman's proposal concerning the derivation of action sentences is totally untenable. I shall then show that Davidson's analysis is semantically defective. Finally, I shall provide a sketch of an alternative analysis which, although not without problems of its own, seems to me to be more promising than the analysis proposed by Davidson.

As far as I can determine, Davidson (1967: 84) provides only one direct syntactic argument for his analysis of action sentences. This argument is based on an alleged parallel between data like (6) and (7).

- (6) I bought a house--it is downtown and it has four bedrooms.
- (7) John stumbled--he did it in the park and he did it at noon.

It is clear, I think, that the it that occurs in (6) not only refers back to the phrase a house but is also referential. Davidson holds the view that the two occurrences of it in (7) function similarly. According to this view, these two occurrences of it are referential, referring to what John did. If Davidson is right, we might take the two occurrences of it in (7) as providing direct evidence of the presence in underlying structure of the extra term Davidson would assign to the action verb stumbled. The difficulty with Davidson's argument is that there is every reason to believe that the two occurrences of it in (7) are neither anaphoric nor referential.

It is characteristic of genuine anaphoric pronouns that they are plural when their antecedents are plural or conjoined, as is true in the underlined occurrences of they in (8).

- (8) I bought a house and Mary bought a house--they are both downtown and they both have four bedrooms.

As the deviance of (9) shows, conjoined action sentences are not pronominalized by plural pronouns.

- (9) \*John stumbled and Bill stumbled--they did them in the park and they did them at noon.

I am inclined to believe that the unacceptability of (9) is evidence that we are not dealing with an anaphoric pronoun in the case of the two occurrences of it of (7).

In Ross' (1972) analysis of action sentences, he formalized the rule that gives rise to the two occurrences of it that we find in (7) as a clause pronominalization rule, even though he refers to this rule as S Deletion. There are, it seems to me, two reasons to believe that this rule is in fact a clause deletion rule. The first reason is that if it were a pronominalization rule, it should be the case that (9), like (8), is well-formed, but it is not. The second reason is that if we treat this rule as a clause deletion rule and accept Ross' analysis of action sentences, then we can account for the occurrences of it in (7) and (10) with the same rule.

- (10) I hate it that Joe married Sue and Bill hates it too.

According to this hypothesis, (10) is derived from (11) and (7) from (12) by applications of the suggested rule of clause deletion.

- (11) I hate it that Joe married Sue and Bill hates it that Joe married Sue too.

- (12) John did (<sub>NP</sub>it (<sub>S</sub>John stumbled<sub>S</sub>)<sub>NP</sub>)--he did  
 (<sub>NP</sub>it (<sub>S</sub>he stumbled<sub>S</sub>)<sub>NP</sub>) in the park and he  
 did (<sub>NP</sub>it (<sub>S</sub>she stumbled<sub>S</sub>)<sub>NP</sub>) at noon.

If this minor revision of Ross' analysis is correct then we have a second reason not to interpret the two occurrences of it in (7) as genuine anaphoric pronouns.

A third point that should be made, I think, is that even if the two occurrences of it in (7) are anaphoric pronouns, they are surely abstract ones, and, thus, would be like those that occur in (13) and (14).

- (13) My idea was rejected before it was even discussed.  
 (14) The fact that Joe died was brought to my attention before it was mentioned to Bill.

The occurrences of it in (13) and (14) are clearly anaphoric. However, we surely do not want to say that they are referential. It is difficult to see how one could justify assuming that the two occurrences of the abstract pronoun it in (7) are referential.

As I noted earlier, Harman has suggested that Davidson's theory of action sentences is consistent with what is known of English syntax. In support of this contention, he suggests a possible derivation of the action sentence (15).

- (15) John walked in the street.

According to Harman, who, unlike Davidson, provides an analysis of tense, (15) is derived from (16) by a rule of "pre-cyclic relative clause formation" that maps (16) into (17).

- (16) (e) (past e & walk j e & in e s)  
 (17) (e) (past e (walk j e (in e s))),

by a rule of "pre-cyclic deletion of existentially quantified variable" that maps (17) into (18).

- (18) past (walk<sub>j</sub> (in s)),

by a rule of "cyclic subject raising" that maps (18) into (19),

- (19) j (past (walk (in s))),

and finally, by a rule of "tense incorporation" that maps (19) into (15). There are, so it seems to me, at least three flaws to Harman's proposed syntactic analysis. In the first place, note that the occurrence of e in the second conjunct of (16) plays the dual role of relative pronoun and head of a relative clause. That is, this occurrence of e is the relative pronoun of the clause modifying the occurrence of e in the first conjunct of (16) and is the head of the relative clause consisting of the third conjunct of (16). But a single

constituent simply cannot play this dual role. Suppose that we have an underlying structure something like that of (20).

(20) John saw the boy and I saw the boy and the boy is happy.

Given this underlying structure, Harman's rule of "pre-cyclic relative clause formation" will allow us to derive (21).

(21) \*John saw the boy (who (who is happy) I saw).

In (21) the underlined occurrence of who is playing the dual role of relative pronoun and head of a relative clause. As the deviance of this sentence suggests, a constituent simply cannot play this dual role.

The second flaw to Harman's proposed derivation is that, as far as I can see, it will give the wrong surface structure to any sentence containing both a place and a time adverbial. Presumably, sentence (22) will be derived from an underlying structure something like (23).

(22) John walked in the street at noon.

(23) (3e) (past e & walk j e & In e s & At e n)

If I understand Harman, the result of applying "pre-cyclic relative clause formation" and "pre-cyclic deletion of existentially quantified variable" to (23) would yield (24), but (24) is clearly not the correct surface structure for (22) for it falsely claims that at noon is subordinate to in the street in (22).

(24) past (walk j (in s (at n)))

The third flaw to this analysis is that to the degree that Harman's "pre-cyclic relative clause formation" works at all it crucially depends on the conjuncts of a structure like (16) being in the order Harman gives or else it will generate word salad. This will require some very complicated deep structure constraints guaranteeing that the input to "pre-cyclic relative clause formation" be such that it will generate a possible surface structure order.

I would like to turn now to consider some semantic difficulties with Davidson's analysis. As we noted earlier, Davidson's analysis can account for the fact that (3) entails both (1) and (2). However, there are two important entailments of (3) that his analysis cannot account for. Note, for instance, that (3) entails both (25) and (26).

(25) John was in the park.

(26) John was in the park at noon.

The difficulty with Davidson's analysis is that the logical form of (3) imputes no relationship between the subject of stumbled and the place adverbial. As a result, if we adopt Davidson's analysis some novel semantic device must be postulated in order to account for the fact that (3) entails (25) and (26), or we must alter Davidson's

analysis of (3) along the lines suggested by (27).

(27)  $(\exists x)$  (Stumbled (John, x) & In (John, park) &  
At (x, noon))

However, logical form (27) does not entail either (2) or (26). Thus, within the sort of framework Davidson presents, we appear to be unable to account for all of the entailments of sentence (3).

Davidson's analysis not only fails to account for some entailments of the action sentence (3), it provides for some rather dubious ones. Observe, for instance, that logical form (5) entails both (28) and (29).

(28)  $(\exists e)$  (In (e, park))  
(29)  $(\exists e)$  (At (e, noon))

It is not at all clear to me that (28) and (29) are semantically well formed. In any event, they certainly do not underlie any English sentences.

One of the more serious flaws with Davidson's analysis of action sentences is that it does not extend in any natural way to sentences that describe states of affairs. Yet, as Romane Clark (1970) has observed, such sentences exhibit the same two problems that Kenny found in connection with action sentences. As (30)-(32) show, the predicate miserable is superficially variable in its polyadicity.

(30) John was miserable.  
(31) John was miserable in New York.  
(32) John was miserable in New York last year.

Moreover, (30)-(32) exhibit the same sort of entailment relations shown to obtain in connection with (1)-(3). Sentence (32) entails both (30) and (31) and (31) entails (30). And, just as (3) entails (25) and (26), (32) entails both (33) and (34).

(33) John was in New York.  
(34) John was in New York last year.

It should be clear that we could provide an analysis of sentences describing states of affairs analogous to that provided by Davidson for action sentences if we were willing to quantify over states of affairs. Such a move would give rise to an analysis something like (35) for sentence (32).

(35)  $(\exists s)$  (Mis (j, s) & In (s, N.Y.) & During (s,  
last year))

This analysis would allow us to treat miserable as stable in its polyadicity and allow us to account for the fact that (32) entails (30) and (31) and that (31) entails (30). However, as with Davidson's analysis of action sentences, there are entailments of (32) that this analysis cannot capture (e.g. (33) and (34)) and some entailments

that are somewhat dubious (e.g. (36) and (37)).

- (36) (Es) (In (s, N.Y.))  
 (37) (Es) (During (s, last year))

The fact that sentences describing states of affairs present essentially the same problems as action sentences insofar as adverbial modification is concerned suggests that a more general solution than has been offered by Davidson is in order. In what follows, I would like to present a sketch of an alternative analysis of the function of place and time adverbials in action sentences and in sentences that describe states of affairs that can account for a wider class of entailments than does Davidson's analysis and which does not run afoul of the problem of variable polyadicity.

In my Winter 1973 LSA paper (cf. M. Geis 1974a) I argued that

- (38) The function of place adverbials is to locate one or more of the participants of actions and states of affairs and the like in space.

According to this view, the place adverbials of sentences like (2), (3), (31), and (32) originate in semantic structure in propositions like those that underlie sentences like (25) and (33). I presented the arguments for this position in M. Geis (1974b) and will assume its correctness here. I also argued in the LSA paper cited that

- (39) The function of time adverbials and of some elements of the auxiliary is to locate actions and states of affairs and the like in time.

Jonnie Geis (1970) has provided an analysis of data like (31) and (32) which seems to me to be more promising than one based on quantification over states of affairs, and which is consistent with hypotheses (38) and (39). She has argued that (31) and (32) are derived from (40) and (41), respectively, by rules that delete he was and while.

- (40) John was miserable while he was in New York.  
 (41) John was miserable while he was in New York last year.

And, in M. Geis (1970) it is argued that while-clauses are relative clauses whose antecedent has been deleted. According to this view, (40) and (41) are derived from something like (42) and (43), respectively, by a rule that deletes during the time (obligatorily for some speakers and optionally for others).

- (42) ?John was miserable during the time while he was in New York.  
 (43) ?John was miserable during the time while he was in New York last year.

In the works cited, syntactic and semantic arguments are given for the suggested analyses of (31) and (32). Here I would like to point out that the proposed analyses of (31) and (32) are consistent with the entailment relations we observed in connection with these sentences. Sentences (41) and (43), like (32), entail (30), (31), (33), and (34). And, sentences (40) and (42), like (31), entail (30) and (33). Thus, the suggested analysis can account for a wider class of entailments than the analysis based on quantification over states of affairs. Moreover, the analysis is syntactically well motivated.

J. Geis' analysis of data like (31) and (32) can be extended to some action sentences. Observe, for instance, that (44) and (45) are paraphrased by and have the same entailments as (46) and (47), respectively.

- (44) John worked on time adverbials in his hotel room.
- (45) John worked on time adverbials in his hotel last night.
- (46) John worked on time adverbials (?during the time) while he was in his hotel room.
- (47) John worked on time adverbials (?during the time) while he was in his hotel room last night.

On the other hand, this analysis clearly cannot be extended to all action sentences. Sentence (48), for instance, is not only not a paraphrase of (3), it is in fact semantically deviant.

- (48) \*John stumbled while he was in the park at noon.

Before suggesting an analysis of (3), let us note that J. Geis' analysis of the while-clause locatives of data like (31), (32), (44), and (45) is consistent with hypotheses (38) and (39), for the postulated remote structures consist of two clauses, one describing a dated action or state of affairs and the other describing a dated spatial predication, itself a dated state of affairs. Moreover, the postulated remote structures of (31), (32), (44), and (45) seem to have the same entailments that these sentences do. What we require is a theory of the logical forms of these sentences and of their remote structures which can account for these entailments without appeal to novel semantic devices (if possible). Moreover, we need an analysis of data like (3).

In what follows, I would like to present a more precise statement of hypothesis (39), show that data like (3) are consistent with it, and then suggest logical forms for sentences containing while-clause locatives. It will not be possible in the time remaining to provide a serious defense of the proposed theory. However, I hope it will have the virtue of being sufficiently precise to be testable.

I would like to suggest that the canonical form for any action sentence or sentence describing a state of affairs is as in (49),

where  $Q$  is a quantifier, capital  $T$  is a temporal sentential operator, one of whose lexical realizations is at,  $S$  is a "bare bones" description of a state of affairs or action, lower case  $t$  is a variable ranging over points in time, and  $T_n$  is one of the relations earlier than, later than, or equals.

(49)  $(Qt) (T (S, t) \& T_n (t, now))$

According to this view, a sentence like (1) will be represented as in (50).

(50)  $(\exists t) (T (Stumble (j), t) \& Earlier (t, now))$

Logical form (50) also underlies sentence (51).

(51) John stumbled at some time.

That (1) and (51) should have the same logical form is supported by the fact that they are logically equivalent. Datum (52) also supports this view.

(52) John stumbled and the reason is that no one was holding him up at the time.

The adverbial at the time in (52) is clearly anaphoric, referring back to the time at which John stumbled. The proposal that (1) has the same underlying structure as (51) provides an anaphor in semantic structure for this anaphoric time adverbial.

Before giving analyses of (2) and (3), let me suggest that a sentence like (25) should be represented as in (53), where  $AT$  is a primitive locative relation, whose lexical realization is at,  $p$  is a variable ranging over points in space,  $\in$ , which is realized as in, is the relation "is a member of", and  $PARK$  is a name standing for a set of places.

(53)  $(\exists t) (\exists p) (T (AT (j, p), t) \& Earlier (t, now) \& (p \in PARK))$

One of the virtues of such an analysis is that it enables us to account for the fact that (25) entails (54).

(54) John was at some place.

I would like now to suggest that (2) has logical form (55).

(55)  $(\exists t) (\exists p) (T (Stumble (j), t) \& Earlier (t, now) \& T (AT (j, p), t) \& p \in PARK)$

Observe, that given this representation for (2) we can account for the fact that (2) entails (1) and (25), the latter entailment being

impossible on Davidson's analysis. Moreover, we can account for the fact that (2) entails (56), something Davidson's analysis cannot do.

(56) At the time when John stumbled, he was in the park.

Turning to (3), I would suggest a logical form something like (57).

(57)  $(\exists t) (\exists p) (T (\text{Stumble } (j), t) \ \& \ \text{Earlier } (t, \text{now}) \ \& \ (t = \text{noon}) \ \& \ T (\text{AT } (j, p), t) \ \& \ (p \in \text{PARK}))$

Given this representation for (3), we can account for the fact that (3) entails (1), (2), (25) and (26). As we noted earlier, Davidson's analysis cannot account for the latter two entailments of (3). Moreover, the suggested analysis can also account for the fact that (3) entails (58), something Davidson's analysis cannot do.

(58) John stumbled at noon and he was in the park then.

The proposed analysis of (2) and (3) would appear to be well motivated semantically. Data (59) and (60) provide a quasi-syntactic argument for these analyses.

(59) John stumbled in the park; at the time he was walking with his eyes closed.

(60) John stumbled in the park at noon; at the time he was walking with his eyes closed.

The adverbial at the time in (59) and (60) can be interpreted as meaning "at the time John stumbled". The proposed logical forms for (2) and (3) can account for how we interpret at the time in these sentences, for (55) and (57) provide anaphors for this anaphoric time adverbial. Although this quasi-syntactic argument supports the proposed logical forms for (2) and (3), I must confess that I have no very clear idea how to map (55) and (57) into (2) and (3).

Let us now turn to data like (31), (32), (44), and (45), i.e. to sentences containing while-clause locatives. In order to provide logical forms for these sentences we must, if their proposed remote structures are correct, provide analyses of adverbials like during the time and while. In M. Geis (1970), I argued that while is derived from a time adverbial something like throughout some time. Thus, if we are to account for while-clause locatives we must provide an analysis for the adverbials of sentences like (61) and (62).

(61) John was miserable during the winter quarter.

(62) John was in New York throughout the winter quarter.

What follows is a speculative treatment of the adverbials of (61) and (62), and of sentences containing while-clause locatives.

Adverbials like during the winter quarter are typically ambiguous. On one reading, during the winter quarter has a meaning something like

"during some part of the winter quarter" and on the other it has a meaning something like "all during the winter quarter". Let us call this latter interpretation the "durative" interpretation, and the former the "nondurative" interpretation.

It is worth pointing out, I think, that (31) and (32) are ambiguous in the same way that (61) is. This is one of the motivations for postulating (42) and (43) as the remote structures for (31) and (32), respectively. I would suggest (63a) and (63b) as analyses of the two interpretations of (61), where WQ is a name standing for the set of times that make up the winter quarter in question.

- (63) a.  $(\exists t) [T (\text{Miserable } (j), t) \ \& \ \text{Earlier } (t, \text{now}) \ \& \ (t \in \text{WQ})]$   
 b.  $(\forall t) \{ (t \in \text{WQ}) \supset [T (\text{Miserable } (j), t) \ \& \ \text{Earlier } (t, \text{now})] \}$

The representation of the adverbial throughout the winter quarter clearly contains a universal quantifier. I suggest (64) as an analysis of the logical form for (62), where NYC is a name that stands for the set of places comprising New York City.

- (64)  $(\exists p) \{ (p \in \text{NYC}) \ \& \ (\forall t) [ (t \in \text{WQ}) \ \supset \ (\text{Earlier } (t, \text{now}) \ \& \ T (\text{AT } (j, p), t))] \}$

As I noted earlier, these representations are quite speculative. However, in their defense I would point out that the two representations given in (63) allow us to account for the fact that (61) entails (65) on both of its readings, and representation (64) enables us to account for the fact that (62) entails (66).

- (65) There was a time at which John was miserable.  
 (66) There was a time at which John was in New York.

With this background, let us return to sentences containing while-clause locatives. Sentences (32) and (41) were said to be derived from a remote structure something like (43). I would like to suggest that (43), and thus (32) and (41), has a logical form something like (67) on the durative interpretation of these sentences.

- (67)  $(\exists r) \{ \text{Period } (r) \ \& \ (\forall t_i) [ (t_i \in r) \ \supset \ (\text{Earlier } (t_i, \text{now}) \ \& \ T (\text{Miserable } (j), t_i))] \ \& \ (\exists p) [ (p \in \text{NYC}) \ \& \ (r < \text{LY}) \ \& \ (\forall t_j) ((t_j \in r) \ \supset \ (\text{Earlier } (t_j, \text{now}) \ \& \ T (\text{AT } (j, p), t_j))] \}$

In (67), r is a set of times and LY is a name standing for the set of times comprising the last year in question. The logical form for the nondurative interpretation of (32), (41), and (43), differs from (67) in that  $\forall t_i$  is replaced by  $\exists t_i$  and the first conditional operator is replaced by a conjunction operator.

The assignment of logical form (67) and its nondurative variant to (32), (41), and (43) enables us to account for the fact that these sentences entail (30), (31), (33), and (34). We arrive at (31), for example, by dropping the conjunct  $r \subset LY$  from (61). We arrive at (30) by dropping the last two lines of (67). We arrive at (34) by dropping the second and third lines of (67), and we arrive at (42) by dropping the second and third lines of (67) and the conjunct  $r \subset LY$ .

Although the analyses of the action sentences (2) and (3) and of the state of affairs sentence (32) are speculative, the approach suggested here, which is based on quantification over times, as opposed to quantification over events, seems to me to be superior to Davidson's on several grounds. It accounts for adverbial modification in both action sentences and sentences describing states of affairs. It accounts for a wider class of entailments of sentences containing time and place adverbials than does Davidson's, and it does not involve postulating unmotivated entities such as Davidson's term referring to events in the logical forms of sentences.

#### Footnotes

\*This paper is in essentially the same form as that read at the summer meeting of the LSA, July 1974, and represents a partial draft of a longer study of time and place adverbials which is in progress. I am indebted to Bill Lycan for his comments on a previous draft of this paper.

1. Two representative passages from Davidson:

Concerning the analysis of action verbs Davidson (1967: 92) writes:

The basic idea is that verbs of action--verbs that say "what someone did"--should be construed as containing a place, for singular terms or variables, that they do not appear to. For example, we would normally suppose that "Shem kicked Shaun" consisted in two names and a two-place predicate. I suggest, though, that we think of "kicked" as a three-place predicate, and that the sentence be given in this form:

(17)  $(\exists x)$  (Kicked (Shem, Shaun, x))

If we try for an English sentence that directly reflects this form, we run into difficulties. "There is an event  $x$  such that  $x$  is a kicking of Shaun by Shem" is about the best I can do....

Concerning the analysis of adverbs, Davidson (1969: 219f.) writes:

Adverbial modification is...logically on a par with adjectival modification: what adverbial clauses (sic) modify is not verbs, but the events that certain verbs introduce. "Sebastian

strolled through the streets of Bologna at 2 a.m." then has this form: "There is an event x such that Sebastian strolled x, x took place in the streets of Bologna, and x was going on at 2 a.m."

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