

## Generics

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### INTRODUCTION

Generics are statements such as “doctors heal people”, “a tiger is striped”, “the dodo is extinct”, “a duck lays eggs”, “kettles boil water”, and “mosquitoes carry the West Nile virus”. Generic statements express general claims about kinds and categories, rather than claims about particular individuals. In English, generics can be expressed using a variety of syntactic forms: *bare plurals* (e.g. “ducks lay eggs”), *indefinite singulars* (e.g. “a tiger is striped”), and *definite singulars* (“the dog is a mammal”).

Quantified statements, such as “all dogs are mammals” or “most tigers are striped”, can also be used to express general claims about kinds. However, quantified statements, unlike generics, can be used to answer the question *how much* or *how many*. For example, if asked “how many tigers are striped”, one could felicitously reply by saying “all/most tigers are striped”. One could not felicitously reply by using the generic “tigers are striped” (Carlson 1977).

The truth conditions of generics have proved quite elusive for semanticists. For example, “dogs are mammals” seems to require for its truth that all (possible) dogs be mammals. “A tiger is striped” or “ravens are black”, however, are somewhat more forgiving, since they are compatible with the existence of a few stripeless tigers (as Siegfried and Roy’s performances attest), and white albino ravens. “Ducks lay eggs” and “a lion has a mane” are more forgiving still; these generics are true even though it is only the mature members of one gender which possess the relevant properties. This truth conditional laxity is limited in scope, however: we do not accept “ducks are female” or “lions are male”, even though every egg laying duck is a female duck, and similarly *mutatis mutandis* for maned lions. Finally, we accept “mosquitoes carry the West Nile virus”, even though fewer than one percent of mosquitoes carry the virus, while also rejecting “books are paperbacks”, when over eighty percent of books are paperbacks. The correct analysis of the truth conditions for generics is a matter of great controversy among theorists working on the problem.

## GENERIC VS. EXISTENTIALS

The interpretation of sentences containing bare plurals, indefinite singulars, or definite singulars can be either generic as in (1) respectively or existential/specific as in (2):

(1) Tigers are striped

A tiger is striped

The tiger is striped.

(2) Tigers are on the front lawn

A tiger is on the front lawn

The tiger is on the front lawn.

The subjects in (1) are *prima facie* the same as in (2), yet their interpretations in (1) are intuitively quite different from those in (2). In (2) we are talking about some particular tigers, while in (1) we are saying something about tigers in general.

There are some tests that are helpful in distinguishing these two readings. For example, the existential interpretation is *upward entailing*, meaning that the statement will always remain true if we replace the subject term with a more inclusive term. For example, if it is true that tigers are on the lawn, then it will also be true that animals are on the lawn. This is not so if the sentence is interpreted generically. For example, it is true that tigers are striped, but it does not follow that animals are striped (Lawler 1973 Laca 1990; Krifka et al 1995). Another test concerns whether we can insert an adverb of quantification (in the sense of Lewis 1975) with minimal change of meaning (Krifka et al 1995). For example, inserting “usually” in the sentences in (1) (e.g. “tigers are usually striped”) produces only a small change in meaning, while inserting “usually” in (2) dramatically alters the meaning of the sentence (e.g. “tigers are usually on the front lawn). (For generics such as “mosquitoes carry malaria”, the adverb “sometimes” is perhaps better used than “usually”.)

### Stage Level and Individual Level Predicates

We might wonder why the interpretations of (1) are so different from the interpretations of (2). The most prominent explanation is that, at least for BP generics, the interpretations

depend on whether the predicates in question are *stage-level* or *individual level*. In particular, stage-level predicates are thought to give rise to existential interpretations, while individual level predicates give rise to generic ones (Carlson 1977).

Intuitively, the distinction between these two types of predicates has to do with whether the predicate denotes a property that may well be had fleetingly (making for a stage-level predicate) versus a property that is more stable and long-lasting (making for an individual level predicate). Examples of stage level predicates include the predicates ‘is drunk’, ‘is barking’, and ‘is on the lawn’ – these properties are normally had only temporarily, or at least intermittently. Individual level predicates express more stable and persistent properties, e.g. ‘is tall’, ‘is a mammal’, and ‘is female’.

The distinction between stage-level and individual-level predicates can also be drawn on the basis of their differential acceptability in a variety of constructions. For example, only stage-level predicates can be used to fill in “\_” in “A saw B \_”. That is, we can say “John saw Mary drunk/barking/on the lawn”, but not “John saw Mary tall/a mammal/female”. Similarly, only stage-level predicates can be used in the construction “there are Ks \_”: “there are firemen available/outside the window”, but not “there are firemen male/tall” (Milsark 1974; Carlson 1977; Stump 1985).

The details of exactly how these different types of predicates may give rise to generic vs. non-generic interpretations of these sentences is beyond the scope of this entry, as the proposals tend to involve technical issues in syntax and linguistic semantics. The original proposal is due to Greg Carlson (1977), however Carlson himself later came to reject the basics of his account (Carlson 1989). More recent discussion can be found in Diesing (1992), Chierchia (1995), Kratzer (1995), Cohen and Erteschik-Shir (1997, 2002), Kiss (1998), and others.

## **GENERICIS AND LOGICAL FORM**

There is some controversy in semantics as to the details of the logical form of generic sentences, however there is also general (though not universal) agreement about the broad features of these logical forms. This section highlights the points of general agreement (**SEE ENTRY ON LOGICAL FORM**).

## **D-Generics and I-Generics**

It is helpful to separate out two categories of generic statements. Our first category includes statements such as “tigers are striped”, “ravens are black”, “a lion has a mane”, and “the dog is carnivorous”. These statements are naturally thought of as expressing generalizations about individual members of the kind. For example, we might suppose that “tigers are striped” is made true by enough individual tigers possessing stripes. The exact nature of these generalizations is highly controversial.

In our second category, we have statements like “dinosaurs are extinct”, “the dodo is extinct”, “tigers are widespread”, and “the domestic cat is common”, which are often thought to predicate a property directly of the kind in question, rather than expressing generalizations concerning its members. For example, in saying “dinosaurs are extinct”, one says something about the kind *dinosaur*, namely that that kind of thing is extinct. We may notice that it is not possible to say of an individual dinosaur Dino that Dino is extinct, since only a kind can be extinct.

Examples of this second category are often referred to as D-generics (‘D’ for ‘definite’) while examples of the first are known as I-generics (‘I’ for ‘indefinite’) (Krifka 1987). It should be noted that the indefinite singular form cannot be used to express a D-generic: statements such as “a dinosaur is extinct” and “a tiger is widespread” are not felicitous.

Much of the work on the semantics of generics has been focused on I-generics, since they have proved the most elusive. It is widely accepted that D-generics are singular statements which predicate properties directly of kinds. For example, “tigers are extinct” predicates the property of *being extinct* directly of the kind *Panthera tigris*, and would be true just in case *Panthera tigris* had the property of being extinct (Krifka et al. 1995). The semantics of I-generics have proved much less tractable.

### **The Logical Form of I-Generics**

For the remainder of this entry, we will be concerned only with I-generics, since they have received the most attention, and been the subject of most controversy. Henceforth, I will use the term “generics” to mean specifically I-generics. This section discusses the dominant theory of the logical form of I-generics, and of necessity involves some

technical material. For readers unfamiliar with the general framework, it will be helpful to first consult the entry on **Logical Form**.

It is generally agreed that there is a two-place operator, usually termed *Gen*, which functions as an adverb of quantification (Lewis 1975). Examples of adverbs of quantification include ‘usually’, ‘generally’, ‘sometimes’, and so on. They relate one set of conditions containing at least one free variable to another set. The variables may range over individuals, or over cases or situations, as in (3), whose Lewisian analysis is given by (4):

(3) Usually, when John comes home, he sleeps.

(4) Usually s [John comes home in s] [John sleeps in s]

This yields a *tripartite structure*, consisting of a *quantifier* (“Usually s”), a *restrictor* (“John comes home in s”), and a *scope* (“John sleeps in s”). In this example, the material from the when-clause is in the restrictor, and the material from the main clause is in the scope.

Generics are standardly assimilated to this model. A common assumption (Heim 1982; Kamp 1981; Kamp and Reyle 1993; Diesing 1992; Kratzer 1995; and many others) is that indefinites such as bare plurals and indefinite singulars contribute predicates with unbound variables to the logical forms containing them. During syntactic processing, the material in the sentence is divided up into the restrictor and scope (e.g. Diesing, 1992). If the sentence contains a quantificational adverb (e.g. “usually”, “always”), then any unbound variables in the restrictor are bound by that quantificational adverb, as in example (4) above. However, if there is no quantificational adverb, the generic operator *Gen* is introduced to bind those variables. Thus, to take a simple example, the logical form of a sentence like “ravens are black” may be given as follows:

(5) Gen x [Ravens(x)] [Black(x)]

Even theorists who do not agree with the assumption that indefinites contribute just predicates and unbound variables to their logical forms (see, e.g. Chierchia 1998) tend to agree that a tripartite structure nonetheless is the correct analysis for generics. (However,

Liebman (forthcoming) disputes this claim, arguing that I-generics should have the same logical forms as D-generics.)

A significant virtue of the tripartite structure is that it is readily able to accommodate intuitions of ambiguity, such as those associated with sentences such as “typhoons arise in this part of the Pacific”, which can be understood as either “typhoons in general have a common origin in this part of the Pacific”, or as “there arise typhoons in this part of the Pacific” (Carlson 1989). These different readings correspond to two different logical forms, given schematically by (6) and (7) respectively:

(6) Gen x [x is a typhoon] [x arises in this part of the Pacific]

(7) Gen e [e is a (contextually relevant) event involving this part of the Pacific] [e involves the arising of typhoons]

The term “generic” is sometimes extended to sentences such as “Mary smokes after work”, since these habitual statements share various features with generics, although they do not express generalizations concerning *kinds*. It is often believed that these statements should be analyzed with Gen (e.g. Lawler 1972; Schubert and Pelletier 1989, Krifka et al 1995, and many others):

(8) Gen e [Relevant-event-involving-Mary(e) & Occurs-after-work(e)] [Event-of-Mary-smoking(e)]

For the remainder of this entry, the term “habitual” rather than “generic” will be used for these statements.

## **THE SEMANTICS OF GENERICS**

A great deal of work has been done on the semantics of (I-)generics, particularly on bare plural (I-)generics. It is easy to see why this is so: “Ducks lay eggs” is a true generic, while “ducks are female” is false, yet it is only the female ducks who ever lay eggs. “Mosquitoes carry the West Nile virus” is true, and “books are paperbacks” is false, yet less than one percent of mosquitoes carry the virus, while over eighty percent of books are paperbacks. How are we to account for these puzzling facts?

It is clear that generics are not equivalent to universal statements, but rather permit exceptions – that is, generics can be true even if some (or sometimes many) members of the kind lack the property in question. Generics also do not mean ‘most’; it is

false that most mosquitoes carry the West Nile virus and true that most books are paperbacks, but our intuitions about the truth/falsity of the corresponding generics are reversed.

As these examples suggest, Gen cannot be analyzed as sharing a meaning with any of the standard quantifiers. One question that comes up immediately is whether Gen can be considered a quantifier in any sense. Carlson (1977) argued informally that it could not, since generic do not tell us *how much* or *how many*. He notes that, if asked “how many tigers are striped”, one could reply “most/all/many/some tigers are striped”, but not simply “tigers are striped”. Leslie (2007) offers a more formal argument to the effect that Gen cannot be considered a quantifier in any of the standard senses, since it is not isomorphism invariant, nor does it partition the power set of the domain of discourse.

A significant number of theories concerning the meaning of generics have been offered over the years. Most theories have focused primarily on bare plural generics, though some theories are intended to cover indefinite and definite singulars too. I will conclude with some remarks concerning issues specific to indefinite and definite singulars.

### **Possible Worlds and Normalcy-Based Approaches**

Many accounts of generics are framed in terms of some or other type of quantification over possible worlds ((Dahl 1975, Delgrande 1987, Schubert and Pelletier 1989, Asher and Morreau 1995, Krifka et al 1995, Pelletier and Asher 1997, Greenberg 1998, and others; see **Possible Worlds Semantics**). Often, these possible worlds are employed to capture the intuition that generics tell us something about what is *normal* for members of a kind (see Nickel 2008). For example, it is natural to think that a generic such as “tigers are striped” tells us something about normal tigers; the only exceptions to it are those tigers who are albino, and so in some respect out-of-step with the norm for the kind. Similarly, “dogs have four legs” may strike us as true because the only dogs who do not have four legs either have birth defects or have met with misfortune.

Possible worlds are helpful here, because they allow us to consider, say, worlds in which things go *as normally as possible* for a given tiger, even if life is *actually* quite abnormal for that tiger. For example, Asher, Morreau, and Pelletier argue that “Ks  $\phi$ ” is

true iff for each individual  $K$ , the most normal worlds for that  $K$  (according to a contextually determined ordering base, see **Possible Worlds Semantics**), are such that that  $K \phi$ s (Asher and Morreau 1995; Pelletier and Asher 1997). Glossed in more intuitive terms, the account states that a generic “ $K$ s  $\phi$ ” is true iff each individual  $K$  would have the property  $\phi$  if all was to go as normally as possible for that  $K$ . Thus, while in actuality some dogs are three legged, one might suppose that, *had things gone more normally for each of those dogs*, they would have had four legs.

Pelletier, Asher, and Morreau connect their semantic account of generics to the literature on defeasible validity (McCarthy 1986; Reiter 1987, and others). A set of premises defeasibly or *non-monotonically* entails a conclusion if the conclusion is likely or reasonable given the premises, yet it is nonetheless possible for the premises to be true and the conclusion false. They argue that there are many defeasibly valid patterns of entailment that involve generics, and that their semantics explains why this is so. For example, if Fido is a dog and dogs have four legs, then the inference that Fido has four legs is held to be defeasibly valid. It is *possible* that Fido is a three legged dog, but it is still *reasonable* to suppose that Fido is four legged on the basis of the premises. The reasonableness of this inference is explained on Pelletier, Asher, and Morreau’s semantics – the generic “dogs have four legs” guarantees that, if things go normally for a given dog, then that dog will have four legs. Since we have been given no reason to suppose that Fido is abnormal, one may defeasibly conclude that Fido is four legged.

Indisputably, a large number of true generics of the form “ $K$ s  $\phi$ ” are such that, if things go normally for a given  $K$ , then it has the property  $\phi$ . However, there would seem to also be a number of true generics which do not fit this profile: “ducks lay eggs”, “lions have manes”, “mosquitoes carry the West Nile virus”, and “sharks attack swimmers”. The latter two generics present a significant difficulty for normalcy based accounts, since it is surely not *normal* for a mosquito to carry the virus, nor is it *normal* for a shark to attack a bather. For generics such as “ducks lay eggs” and “lions have manes”, several theorists have argued that the domain of discourse is restricted so that we are talking about only the female ducks and the male lions respectively, and thus aimed to rescue normalcy-based approaches from this criticism (e.g. Pelletier & Asher, 1997), since perhaps it is abnormal for a given female duck to fail to lay eggs. Leslie (2008) argues



that if such domain restriction were available, then a number of false generics would be predicted to be true. Khemlani, Leslie, and Glucksberg (2009) report empirical evidence that further suggests that people do not understand these generics to involve domain restriction. If one cannot appeal to domain restriction to handle “ducks lay eggs”, then such generics would appear to constitute counterexamples to this sort of approach.

### **Domain Restriction: Relevant Quantification and Situation Semantics**

Appeals to domain restriction are not limited to normalcy based approaches. In light of generics such as “ducks lay eggs”, some theorists have argued that generics involve quantification over *relevant* individuals (actual or possible), where context determines which individuals are relevant (e.g. Schubert and Pelletier 1987; Declerck 1991; Chierchia 1995). On such views, when we consider a generic such as “ducks lay eggs”, only the mature, fertile female ducks enter into our evaluation of the sentence, because, e.g., they are the only potential egg-layers. The question that arises is how exactly to determine which individuals are relevant. Schubert and Pelletier (1987) offer a detailed discussion of how some of these restrictions arise – e.g. via presupposition, focus, linguistic context, or explicit restriction as appropriate.

Ter Meulen (1986), Gerstner-Link (1988), and Cavedon and Glasbey (1994) offer treatments of generics in the framework of situation semantics (Barwise and Perry 1983). On such views, generics express *constraints* on situations – e.g. “tigers are striped” expresses the constraint that every situation involving a tiger involves a striped tigers. Constraints are not reducible to the properties of individuals (Cavedon and Glasbey 1994). The interpretation of a generic on these views is relative to a given context (channel), so as on the above views, generics such as “ducks lay eggs” are evaluated only with respect to the female ducks (Cavedon and Glasbey 1994).

As noted above, there are philosophical and empirical difficulties (e.g. Leslie 2008; Khemlani et al. 2009; see also Cimpian, Brandone & Gelman 2010) facing any accounts that rely on domain restriction to handle generics such as “ducks lay eggs”. For these accounts to succeed, these difficulties would need to be addressed in more detail.

### **Stereotypes and Prototypes**

A somewhat different approach to the semantics of generics is taken by theorists who suppose that generics express stereotypes or prototypes. On such views, “tigers are striped” would express that the stereotypical or prototypical tiger is striped, and likewise, “sharks attack bathers” would express a belief about the stereotypical or prototypical shark. Geurts (1985) and Declerk (1986) suggest that generics may be interpreted as expressing culturally accepted stereotypes, and Platteau (1980), Nunberg and Pan (1975), and Heyer (1985, 1990) claim that generics express prototypes, in the sense of Rosch (1978). Thus on such views, “tigers are striped” would express the fact that the stereotypical or prototypical tiger is striped.

A general concern with views of this type is that they would seem to make the holding of the relevant sort of false belief sufficient to render the generic true. For example, suppose that people falsely associate sliminess with snakes in the relevant way (e.g. has a culturally held stereotype, or part of the Roschean prototype, etc). This does not make the generic “snakes are slimy” true (Krifka et al., 1995). While it is plausible that people often *assert* generics on the basis of their prototypical/stereotypical beliefs, it is implausible to think that these beliefs enter into the *truth conditions* of generics. Stereotypical beliefs can be, and often are, false (**See entry on Race and Language**).

### **Probabilistic Approaches**

Cohen (1996, 1999, 2004) argues that generics can be understood in terms of comparative probabilities. There are two different ways for a generic to be true on Cohen’s view. The first way (Absolute) can be illustrated by “tigers are striped”. This is a true generic because (roughly speaking) a randomly chosen tiger is more likely than not to be striped. The second way (Relative) a generic can be true involves comparison with other kinds. For example, on Cohen’s account, “mosquitoes carry the West Nile virus” is true because (again roughly speaking) if we pick a mosquito and another insect at random, the mosquito is more likely than the insect to carry the West Nile virus. Thus on Cohen’s view, generics are made true (or false) by such probabilistic considerations. More precisely, Cohen’s categories are as follows:

Absolute generics:

‘Ks are F’ is true iff the probability that an arbitrary K that satisfies some predicate in Alt(F) satisfies ‘is F’ is greater than .5

Relative Generics:

‘Ks are F’ is true iff the probability that an arbitrary K that satisfies some predicate in Alt(F) satisfies ‘is F’ is greater than the probability that an arbitrary member of Alt(K) that satisfies some predicate in Alt(F) satisfies ‘is F’.

As it stands, however, Cohen’s account incorrectly predicts that generics such as “bees are sterile” will be true, since the probability that a given bee is sterile is greater than .5. To deal with such cases, Cohen introduces the homogeneity constraint:

Homogeneity Constraint:

The above probability conditions (exceeding .5, or exceeding that of the arbitrary alternative to the kind) should hold in *all salient partitions* of the kind.

Generics such as “bees are sterile” are now predicted to be false, because there is a salient partition of bees into workers, queens, and drones, and queen bees have a very low probability of being sterile.

Leslie (2007, 2008) argues that Cohen’s account faces some counterexamples. For example, humans are (trivially) more likely to suffer from autism than other mammals, and so “humans are autistic” would seem to be falsely predicted to be a true (relative) generic (and it is hard to see how homogeneity could undermine this prediction). This example illustrates that unique possession of a property by a kind is not generally sufficient for the truth of a generic, yet the category of relative generic predicts that, modulo homogeneity, this should suffice. Leslie (2007, 2008) offers additional counterexamples to Cohen’s conditions.

Recent empirical work also suggests that the homogeneity constraint does not guide people’s understanding of generics. For example, Cimpian, Gelman, and Brandone (2010) found that adults are not at all reluctant to accept a generic that involves a property found only in one salient partition of a kind, contra the predictions of the homogeneity constraint (though this was not the intent behind the experiment).

### **Generics and Psychology**

Recent work in psychology by Susan Gelman and her collaborators shows that generics are very easily acquired by young children. In particular, generics are understood by young children more easily than explicit quantifiers such as “most”, and even “all” and

“some”, at least when used to make kind-wide generalizations (Gelman 2003, 2004; Gelman, Goetz, Sarnecka, and Flukes 2008, Gelman and Tardiff 1998; Hollander, Gelman, and Star 2002; Leslie and Gelman submitted; Papafragou and Schwarz 2005/2006 and other studies in progress). This is *prima facie* puzzling since, as the above discussion indicates, the semantics of generics look to be very complex.

Leslie (2008) argues from these considerations and others that generics give voice to cognitively default generalizations, and that quantified statements give voice to cognitively more sophisticated, non-default ones. This hypothesis has gained some empirical support from the finding that both adults and young children will *interpret* quantified statements as generics (Hollander, Gelman and Star 2002; Khemlani, Leslie and Glucksberg 2007; Leslie, Khemlani and Glucksberg submitted) and will *recall* quantified statements as generics (Leslie and Gelman submitted).

Leslie further argues that, once we understand the role that generics play in our psychology, we can develop an account of when generics are true and false. Leslie divides generics into three categories: characteristic (including items such as “ducks lay eggs”), majority (e.g. “cars have radios”) and striking/dangerous (e.g. “mosquitoes carry the West Nile virus”). These different classes have different requirements that the world must meet for the corresponding generic to be true. Cimpian, Brandone and Gelman (2010) report empirical results that support Leslie’s thesis that these particular factors differentially impact adults’ willingness to accept generic statements (e.g. adults accept generics at lower prevalence levels if the property in question is strikingly dangerous).

### **DEFINITE AND INDEFINITE SINGULAR GENERICS**

The above discussion was primarily centered on accounts of bare plural generics, which have received the most discussion in the literature. Singular generics introduce their own sets of complications. Unlike bare plurals, singular generics can easily be infelicitous. For example, it is perfectly fine to say (9) or (10):

(9) A madrigal is polyphonic

(10) A football hero is popular

But not (11):

(11) \*A madrigal is popular

(Notice, however, that the plural version of (11) “madrigals are popular” is perfectly felicitous (though perhaps, unfortunately, false).) Lawler (1973) notes that indefinite singulars are only felicitous when they express properties that are somehow “necessary”, “essential” or “inherent” to the kind. Burton-Roberts (1977) argues that indefinite singulars carry a special normative force, while Krifka et al (1995) take a different tact, arguing that the facts can be accounted for in terms of logical form. Greenberg (1998) and Cohen (2001) argue that indefinite singulars can express only ‘rules and regulations’, in the sense of Carlson (1995). These analyses are often implemented by way of possible worlds semantics.

Definite singular generics appear to invoke constraints similar to those of indefinite singulars, but also some more besides. For example, definite singular subjects are often infelicitous if they do not refer to well-established kinds (Krifka et al 1995; example from Carlson 1977, attributed to Barbara Partee):

(12) The coke bottle has a narrow neck

(13) \*The green bottle has a narrow neck

Other constraints on the acceptability of definite singulars have been noted by Nunberg and Pan (1975), Carlson (1977), Dahl (1985), and others. However, definite singular generics have received less attention overall than indefinite singulars, while bare plurals have received by far the most discussion in the literature.

## **NEW DIRECTIONS**

Recently, several philosophers have begun to consider the role generics, and the generalizations they express, may play in various forms of social prejudice (e.g. Haslanger forthcoming; Leslie forthcoming; see the **entry on Race and Language for more details**). More generally, generics continue to be a topic of considerable interest to linguists, philosophers, and more recently, psychologists. There has recently been an explosion of interest among psychologists concerning generics (e.g. Gelman 2003; Prasada and Dillingham 2006, 2009). Recent and on-going work in psychology has been examining issues such as how children acquire generics, how adults process generics, the role of generics in reasoning, and the influence of generics in various forms of prejudice.

This new range of empirical findings will surely be a significant influence on the topic going forward.

### **Related Topics**

“Language and Race”

“Causal Language”

“Possible Worlds Semantics”

“Quantifiers and Determiners”

“Plurals”

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