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Compare Within and Between Groups: The Interpretation of Weak Generic Sentences

Abstract: This paper explicates the precise meaning of weak generic sentences of the form \( Ks \text{ are } P \), best represented by the Port Royal Puzzle sentence Dutchmen are good sailors. The sentence is true even though the majority of Dutchmen do not know how to sail at all and a fortiori do not sail well. Two observations motivate my analysis. One is that weak generic sentences express a property that “distinguishes the subject referent from other entities that might belong to the same category” (Krifka et al. 1995). This leads to the use of alternative set in my analysis. The other observation is that the scale structure of the predicate \( P \) affects the availability of weak generic reading for sentences of the form \( Ks \text{ are } P \). I argue that the interpretation of weak generic sentences involves: (i) partitioning the set of entities denoted by the bare plural subject based on the property denoted by the predicate \( P \); (ii) partitioning the set of entities alternative to the denotation of the subject in a similar fashion; and (iii) comparing an appropriate partition in (i) to its counterpart in (ii) with respect to the predicate \( P \). The Port Royal Puzzle sentence is true if and only if: those Dutchmen who can sail and who are good at sailing in comparison with the Dutch-internal standard of being good at sailing and those international citizens who can sail and who are good at sailing in comparison to the international standard of being good at sailing are such that the former population generally have better sailing skills than the latter population.

Keywords: weak generic sentences; comparison; partition

1 Introduction

In this paper, I address the question of what is the precise meaning of a certain genre of weak generic sentence that typically takes the form of \( As \text{ are } P \), with the subject being a bare plural noun phrase and the predicate typically being another noun phrase modified by an adjective. It is well-known that “regular” generic sentences, such as those in (1) and (2), require all or most (normal) members that meet the description of the subject to have the property specified by the predicate. For a weak generic sentence, however, the property denoted by the predicate holds true of a proportionally small number of the entities meeting the description of the subject. The paradigmatic example of weak generic sentence is probably the famous Port Royal Puzzle (PRP) sentence in (3), which has received much attention among scholars working on generic sentences (e.g., Krifka et al. 1995, Cohen 1999, 2001, Nickel 2012). Most Dutchmen do not know how to sail, let alone being good at sailing, but the sentence is still considered true, or so at least when the sentence was first uttered in the late 17th century when the Dutch was still one of the major seafaring powers in the world. Similarly, the more contemporary sentence in (4) is generally perceived to be true in spite of the fact that many Bostonians take public transportation and do not drive at all, and the fact that most Bostonians who do sit behind the wheel have a good driving habit and record.

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(1) Dogs are mammals.

(2) Lions have manes.

(3) Dutchmen are good sailors.

(4) Bostonians are careless drivers.

Not surprisingly, in the literature, the semantic interpretation of weak generic sentences has been qualitatively distinguished from that of “regular” generic sentences. According to Krifka et al. (1995: 83), such sentences as (3) and (4) “express a property that distinguishes the subject referent from other entities that might belong to the same category”. The PRP sentence roughly says that Dutchmen set themselves apart from people in alternative nations in the relevant context in that Dutchmen have good sailors among themselves. This insight from Krifka et al. (1995) will prove very useful in the analysis that I am to develop in the paper. “Regular” generic sentences, by contrast, are not necessarily interpreted with reference to an alternative population or express a property that distinguishes the referent of the subject from other comparable groups of entities. In this paper, I focus on weak generic sentences, and do not concern myself with “regular” generic sentences.

Even within the realm of weak generic sentences, finer distinctions exist. In particular, the intuitive understanding of weak generic sentences of the form As are P should be distinguished from that of weak generic sentences whose predicates are “regular” verb phrases (Nickel, 2010, 2012). The latter type of weak generic sentence is illustrated in (5) and (6): both sentences can be understood to express a true proposition, despite the fact that the majority of seeds never have a chance to germinate, and the fact that proportionally only a small number of mosquitoes actually carry malaria. Nickel (2010) argued that such weak generic sentences as in (5) and (6), which contain “regular” verb phrases, ascribe an abilitative possibility to the subject referent. A viable paraphrase of (5), for example, is something like “Any seed may/is able to germinate,” which is independent of whether a random seed actually germinates or not. Factoring in this extra layer of abilitative modality, the interpretation of (5) and (6) causes no problem to a normality-based analysis of “regular” generic sentences. Their weak generic reading most likely comes from the pragmatic consideration of how things come about in the actual world.

(5) Seeds germinate.

(6) Mosquitoes carry malaria.

The possibility/ability story as proposed for such sentences as (5) and (6) by Nickel (2010), however, cannot be extended to weak generic sentences of the form As are P. Intuitively, the PRP sentence does not express a modal proposition, viz., that any (normal) Dutchman has the potentiality or capacity to have good sailing skills. For if that were the case, we would expect the sentence Spaniards are good sailors to express a true proposition as well, witness the good number of Spaniards traveling with Christopher Columbus on his voyages at the turn of the 15th century. However, it is (at best) unclear that Spaniards are good sailors is true, even when uttered at the time of Columbus’ voyages. Rather, the PRP sentence appears to express an actual situation in our world. The question to ask, then, is what the situation is and how to represent it in a precise manner. This is the main task that I will take up in this paper.¹

¹ The weak generic sentence in (i) below takes a regular verb phrase, but does not seem to express a capacity of (normal) Frenchmen. I assume the sentence to be an abbreviated form of Frenchmen are prone to eat horsemeat. Thus, it actually is a weak generic sentence covertly taking the form of As are P, and is subject to the same analysis as for the PRP sentence. Whether this assumption is on the right track is left to future research. (i) Frenchmen eat horsemeat.
Acknowledging the distinctions discussed above, in this paper I only focus on weak generic sentences of the form \( As \ are \ P \). Even within this rather narrow undertaking, my objective is a modest one. Weak generic sentences of the form \( As \ are \ P \) have floated around in the formal semantics and philosophy of language literature for at least several decades, but what their precise meaning is notoriously elusive and not yet well defined. I attempt to specify what this type of weak generic sentence exactly means, mostly by drawing on analytic tools that are already available in the literature. During my discussion, I use the PRP sentence in (3) to represent all weak generic sentences of the form \( As \ are \ P \). I do not concern myself with the syntactic representation of these weak generic sentences. More specifically, I focus on addressing the following two related questions concerning the PRP sentence:

Q1: Which sub-group of Dutchmen is relevant for evaluating the PRP sentence?

Q2: How good at sailing should this sub-group of Dutchmen be to verify the PRP sentence?

In the rest of the paper, for simplicity, I will refer to weak generic sentences of the form \( As \ are \ P \) as weak generic sentences. The paper is organized as follows. My analysis of weak generic sentences involves quantification and makes crucial reference to the \( GEN(eric) \) operator. But weak generic sentences have been taken in the literature as key evidence against quantificational approaches to generic sentences. In section 2 I show that one most important argument cited in such literature, concerning the entailment pattern of weak generic sentences, actually can receive a more plausible alternative explanation and hence does not guarantee the intended conclusion. In section 3, I review two important recent analyses of weak generic sentences, by Cohen (1999, 2001) and Nickel (2012) respectively. Both analyses, when taken alone, face serious empirical and theoretical challenges. At the same time, the two analyses largely complement each other in that the merits of one analysis can help remedy the flaws of the other. In section 4, therefore, I provide a hybrid analysis that makes use of the analytic insights from Cohen’s and Nickel’s proposals. My analysis combines alternative set as used in Cohen’s analysis with degree comparison as used in Nickel’s analysis. The interpretation of weak generic sentences involve three components: (i) partitioning the set denoted by the bare plural subject based on the property denoted by the predicate \( P \), (ii) partitioning the set alternative to the denotation of the subject in a similar fashion, and (iii) comparing an appropriate partition in (i) to its counterpart in (ii) with respect to their degree of satisfying the predicate \( P \). Before concluding this paper, in section 5 I briefly address how my hybrid approach deals with the challenges faced by the analyses by Cohen (1999, 2001) and Nickel (2012).

2 The GEN operator

My analysis of weak generic sentences, to be spelled out in section 4, makes crucial reference to the \( GEN \) operator. However, it has been argued in the literature – most notably by Carlson (1977) – that the interpretation of generic sentences should not make reference to \( GEN \). Coincidentally, one crucial piece of evidence that Carlson (1977) cited in support of his claim has to do with weak generic sentences, which he took to lack an entailment pattern observed with “regular” generic sentences. Since this paper deals with the semantic interpretation of weak generic sentences and my analysis will make extensive use of the \( GEN \) operator, it is worthwhile to show that Carlson’s observation actually can receive a more adequate, alternative explanation and does not guarantee the conclusion that he intended for.

According to Carlson (1977), if the PRP sentence involves a covert quantification operator, its LF would be something similar to (7), which involves the \( GEN \) operator. This LF is strongly reminiscent of the LFs in (8), all of which involve an overt quantifier and correspond to the sentences in (9). Carlson claimed that the sentences in (9) entail the corresponding sentences in (10). Furthermore, he postulated that in a similar fashion, the PRP sentence should entail the generic sentence in (11), under the assumption that (7) represents the LF of the PRP sentence. However, the entailment relation appears not to go through. Carlson (1977) took the absence of such an entailment relation as a crucial piece of evidence for his claim that generic
sentences, weak generic sentences included, resist a quantificational analysis making reference to the \textit{GEN} operator.

(7) \textit{GEN}\{x: \text{is a Dutchman}\}\{x \text{ is a good sailor}\}

(8) \textit{ALL/MOST/SOME}\{x: \text{is a Dutchman}\}\{x \text{ is a good sailor}\}

(9) All/Most/Some Dutchmen are good sailors.

(10) All/Most/Some Dutchmen are sailors.

(11) Dutchmen are sailors.

The above argument, however, hinges on an assumption that seems correct at first glance but closer scrutiny would suggest otherwise. Carlson (1977) took the sentences in (9) to mean that all/most/some Dutchmen are sailors and their sailing skills are good. Only as such can the sentences in (9) entail the corresponding sentences in (10). Implicitly assumed in Carlson’s argumentation is that the word \textit{sailor} in (9) is used in the same sense as in (10). He did not consider the possibility that the sentences in (9) would not entail the corresponding sentences in (10), if the word \textit{sailor} in (9) and (10) involves two different senses. If this possibility indeed turns out to be viable, there exists a plausible likelihood that the lack of entailment between the PRP sentence and the sentence in (11), observed by Carlson, is attributable to logical metonymy with the word \textit{sailor} (if not lexical ambiguity with the word).\footnote{The interested reader can refer to Pustejovsky (1995) for detailed discussion of logical metonymy. In this paper, I will leave it open whether the two senses of \textit{sailor} are an instance of logical metonymy or lexical ambiguity. Doing so will not affect the main points to be made in this paper.}

For a more lucid illustration, let us consider the sentence pair in (12) and (13) (due to Menéndez-Benito 2007), which is parallel to the pair in (9) and (10) on the surface. The sentence in (12) can be taken to mean the majority of chisels can \textit{function} as good screwdrivers, and the sentence is true. However, if the word \textit{screwdriver} in (12) is understood to denote the physical tool that is often used to turn a screw, then the sentence expresses a false proposition, for it is definitely not the case that most chisels are indeed the same tool as screwdrivers. For reasons yet unknown to me at this point, the function/utility sense of such words as \textit{screwdriver} is not freely available, but generally requires the presence of certain evaluative contexts (e.g., a modifying evaluative adjective, an exclamation sentence).\footnote{The sentence in (i) below is another similar example: the word \textit{teacher} makes reference to those properties that make a (good) teacher, and it does not denote an individual who takes a teaching position by profession. (i) Everyone in the medical field is a born teacher, so just keep your ears and mind open.} By contrast, without an evaluative context, \textit{screwdriver} in (13) denotes the actual hand tool, and the sentence expresses a false proposition (Menéndez-Benito 2007). Then, it comes as no surprise that (12) does not entail (13).

(12) Most chisels are good screwdrivers.

(13) Most chisels are screwdrivers.

Now let us come back to (9-11) and the PRP sentence. The observation that the sentences in (9) entails the corresponding sentences in (10) is due to the fact that the word \textit{sailor} in each sentence pair can be understood to denote an individual working in the sailing profession. The discussion above predicts that the entailment relation between the PRP sentence and the sentence in (11) would go through if the meaning of \textit{sailor} can be held constant. The actual situation is complicated by other factors, however. The word \textit{sailor} in the PRP sentence – under the weak generic reading under discussion – makes reference to the skills and qualities of an individual (not necessarily one working in the sailing profession) who is good at sailing. The sentence, for reasons yet unknown to me, would not allow the weak generic reading when \textit{sailor} is
understood in the profession sense. The lack of weak generic reading of the sentence in (14), in which sailor is forced to have a profession reading with the modifier by profession, confirms this claim. By contrast, for the sentence in (11) the most natural meaning of sailor, not modified by any evaluative adjective, denotes an individual working in the sailing profession. I believe it is this mismatch in terms of the senses of sailor that is responsible for the lack of entailment relation between the PRP sentence and the sentence in (11).

(14) Dutchmen are good sailors by profession.

In sum, the discussion in this section points to the conclusion that the lack of entailment between the PRP sentence and the sentence in (11) should not be taken as conclusive evidence against a quantificational analysis of (weak) generic sentences. As far as the current research is concerned, this discussion is important in two aspects. First, the analysis of weak generic sentences I am to develop in this paper makes crucial reference to the GEN operator. As far as entailment is concerned (even for weak generic sentences), proposing the GEN operator does not cause empirical or theoretical problems. In fact, many works subsequent to Carlson (1977) adopted the GEN operator in representing the meaning of generic sentences (Wilkinson, 1991; Chierchia, 1995; von Fintel, 1997, among many others). Second, the lack of entailment between the PRP sentence and the sentence in (11) has been a long-standing puzzle that has drawn a considerable amount of attention in the literature. By attributing the phenomenon to logical metonymy (or lexical ambiguity, though less likely), a formal semantic analysis of weak generic sentences does not necessarily have to take it in its grip (cf., Menéndez-Benito 2007).

On a separate note, Carlson (1977) treated generic sentences as involving simple predication, without much consideration regarding what is needed for different types of generic sentence to be true. He argued that the actual interpretation of a particular generic sentence makes recourse not merely to the property of the predicate of the sentence, but also to the worldly affairs of how the subject referent stands with regard to the predication (witness Carlson’s (1977) use of “extra-grammatical processes”). A natural question to ask, then, is what pragmatic considerations are relevant for determining how strong the interpretation of a particular generic sentence is. As far as I can see, Carlson (1977) did not provide an explicit solution to this question. For the PRP sentence, for example, what percentage of Dutchmen who know how to sail have to satisfy the predicate good sailors in order for the sentence to be true? How do “extra-grammatical processes” make an appropriate delimitation? Such questions are essentially among the most important challenges surrounding the semantics of such weak generic sentences that need to be addressed. An analysis of weak generic sentences that makes less or even no reference to “extra-grammatical processes” is presumably more preferable – assuming everything else is equal or comparable, of course.

3 Previous analyses

There are several proposals available in the literature dealing with the question of what weak generic sentences mean. Among them, Cohen (1999, 2001) and Nickel (2012) are worth special attention. As I will show shortly, the two proposals have their individual shortcomings, but at the same time the merits of one can help remedy the problems of the other. This mutual complementarity renders the two proposals primary motivations for the analysis that I will spell out in the next section.

3.1 A mathematical probabilistic approach

Cohen (1999, 2001) took a mathematical probabilistic approach to generic sentences in general. He divided generic sentences into two categories: absolute and relative generic sentences. The exact definitions of the two types are irrelevant for the purpose of the current paper. It suffices to note that the sentences in (1) and (2) exemplify Cohen’s “absolute generic sentences”, and Cohen’s notion of relative generic sentence basically corresponds to our notion of weak generic sentence.
According to Cohen’s analysis, the interpretation of a generic sentence of the form $Ks P$ requires computing the set of alternatives to the property denoted by $P$ ($\text{ALT}(P)$ for short). This applies to the interpretation of both absolute and relative/weak generic sentences. However, absolute generic sentences do not, and relative/weak generic sentences do, require the computation of a set of alternatives to $K$ ($\text{ALT}(K)$). Take the absolute generic sentence in (15a) for example. The set of alternatives to the predicate $\text{bear-live-young}$ contains all possible means of reproduction: \{\text{bear-live-young}, \text{lay-eggs}, \text{undergo-mitosis} \ldots\}^4. Though probably less than half of all mammals give birth to live young, more mammals give birth to live young than reproducing by other means (including laying eggs, undergoing mitosis, and so on). Thus, the sentence is true. More generally, Cohen (2001) defined the probabilistic semantics of absolute generic sentences as in (16):

\begin{align*}
(15) & \ a. \text{Mammals bear live young.} \\
& \ b. \ \text{ALT}(\text{bear-live-young}) = \{\text{bear-live-young}, \text{lay-eggs}, \text{undergo-mitosis} \ldots\}
\end{align*}

\begin{align*}
(16) \text{An absolute generic sentence } Ks P \text{ is true if and only if the probability that a randomly chosen } K \text{ that satisfies at least one of the properties in } \text{ALT}(P) \text{ has the property } P \text{ is greater than .5.}
\end{align*}

The semantic definition in (16), however, cannot account for the truth conditions of relative/weak generic sentences. For example, the PRP sentence expresses a true proposition, but its truth clearly does not require more than 50% Dutchmen who have any non-zero level of sailing skills (“Dutch sailors” henceforth) to be good at sailing. According to Cohen, the interpretation of relative/weak generic sentences of the form $Ks P$ makes reference not just to $\text{ALT}(P)$, but to $\text{ALT}(K)$ as well. He defined the semantics of relative/weak generic sentences as in (17):

\begin{align*}
(17) \text{A relative/weak generic sentence } Ks P \text{ is true if and only if the probability that a randomly chosen } K \text{ that satisfies at least one of the properties in } \text{ALT}(P) \text{ has the property } P \text{ is greater than the probability that a randomly chosen alternative that satisfies one of the members of } \text{ALT}(K) \text{ and one of the members of } \text{ALT}(P) \text{ has the property } P.
\end{align*}

Thus, under Cohen’s interpretation of relative/weak generic sentences, the PRP sentence is true if and only if the probability of a randomly selected Dutch sailor being good at sailing is greater than the probability of randomly selected international sailor being good at sailing.\footnote{Whether the alternative set to an element H (say, “Dutch sailor”) contains the denotation of H itself does not matter for the purpose of this paper. Therefore, the reader can understand “international sailor”, being alternative to “Dutch sailor,” as including both non-Dutch sailors and Dutch sailors, or non-Dutch sailors alone.} In the next sub-section, I show the semantics to be overly simplistic.

### 3.2 Problems with the probabilistic approach

In this section, I show that overall, Cohen’s analysis makes too permissive predictions. First, according to Cohen’s analysis, as far as the proportion of good Dutch sailors (i.e., Dutchmen with good sailing skills, not necessarily Dutch sailors who sail well) to the entire Dutch sailor population exceeds the corresponding proportion for the contextually relevant alternative nationalities, the PRP sentence would be held true. What matters most is the number of good sailors relative to the number of sailors, both for the Dutch population and for the international population. The analysis does not take into consideration the skill distribution of those sailors whose sailing skills fall below the contextual standard of having good sailing skills. Furthermore, as far as I can see, Cohen seemed to assume that this contextual standard remains the same for the Dutch sailor population as for the international population who can sail ("International
sailors” for short). A potential problem arises here, because the distribution of the sailing skills of “non-good” sailors in the Dutch population and in the international population indeed can have an effect on how well the former sail relative to the latter. Take for example the scenario represented in Figure 1 below. 30% Dutch sailors exceed the (singular) contextual standard of having good sailing skills, and the rest of Dutch sailors all have bad sailing skills. Somehow no Dutchman has OK sailing skills that fall between “good” and “bad.” On the other hand, 15% international sailors are good at sailing, and the other 85% are either OK or bad. Moreover, with Cohen’s analysis, the sailing skills of Dutch sailors are evaluated (being good, OK, or bad) against the same standards as for international sailors. Can this scenario verify the PRP sentence? I think the answer depends on the distribution of the sailing skills of those international sailors whose sailing skills are either OK or bad. If most of them belong to the “OK” category such that a significant number of international sailors outperform Dutch sailors, the PRP sentence is most likely false. If most of the 85% OK and bad international sailors belong to the “bad” category so that a significant number of Dutch sailors outperform international sailors, then the sentence may be true. Because Dutch sailors and international sailors who are not considered good at sailing are irrelevant for Cohen (1999, 2001), his analysis would wrongly predict the PRP sentence to be necessarily true in the scenario depicted in Figure 1, because the proportion of good Dutch sailors among all Dutch sailors (i.e., 30%) obviously exceeds the corresponding proportion for the international sailor population (i.e., 15%).

![Fig. 1: Polarized distribution of Dutch sailors](image)

Second, in certain scenarios, Cohen’s analysis may predict two contradictory propositions to have the same truth value. This would occur when the probability of a randomly chosen Dutch sailor being a good sailor and the probability of a randomly chosen Dutch sailor being a bad sailor each exceed the corresponding probability for the international sailor population. Imagine a scenario, as depicted in Figure 2, where 30% Dutch sailors are good at sailing, 40% OK, and 30% bad. Among the international sailor population, the figures are 20%, 60%, and 20%, respectively. In the scenario, Cohen’s analysis would predict the PRP sentence and the opposite sentence Dutchmen are bad sailors to be true at the same time. Of course, this is a highly undesirable result.

![Fig. 2: Good and bad Dutch sailors both exceed international counterparts](image)

The two problems discussed above with Cohen’s analysis have to do with the use of mathematical probability in defining the semantics for generic sentences and particularly the use of the same standard of having good sailing skills for Dutch sailors and international sailors. In addition to these two problems, there is

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6 The careful reader may notice that I am talking rather loosely here. Exactly what I mean by “a significant number of” will be explicated in section 4.
still a third one that is different in nature and that was first pointed out by Nickel (2012). This problem has
to do with how different types of predicate fare with weak generic sentences. Weak generic sentences are
systematically available for relative (i.e., open scale) gradable predicates, as illustrated in (18) 7 (Kennedy
and McNally 2005, Kennedy 2007). The sentence in (18c), for example, expresses a true proposition despite
the fact that less famous, non-brand name electronic products, which account for the majority of the total
electronics market share in China at the time of writing this paper, are usually rather cheap. After all,
comparable to many other countries, electronic products generally are more expensive in China mostly due
to high domestic taxes and tariffs imposed by the Chinese government. The sentence in (18d) is – or at least
be – perceived to be true, given the recent Olympic and other huge-event championships won by a
handful of Jamaicans sprinters (Usain Bolt, Yohan Blake, and so on). Weak generic reading is also available
for fixed, non-maximum standard (i.e., lower closed) gradable predicates such as wet, dirty, bent, and lemon
(in the sense of defective cars).8 For the sentence in (19a) to be true, it does not necessarily require that all
or most fast food restaurants to be dirty. A good number of fast food restaurant being dirty would suffice. 9
Similarly for the sentence in (19b) and (19c). (19b) may be uttered by an individual who knows that just a
small proportion of cars of the relevant brand have quality issues.10 (19c) can be understood to be true even
if just windward hotel rooms with no effective dehumidification systems in coastal cities are wet.

(18) a. Europeans are tall.
    b. Math problems are hard.
    c. Electronics are expensive in China.
    d. Jamaican are fast runners.

(19) a. Fast food restaurants are dirty.
    b. Cars made by that manufacturer are lemons.
    c. Hotel rooms in coastal cities are wet.

By contrast, weak generic sentences are not available for maximum standard (i.e., upper closed) gradable
predicates like full and transparent or for non-gradable predicates like locked and 6-feet tall (Kennedy and
McNally 2005, Kennedy 2007).11 The two sentences in (20) do not allow a weak generic reading. Though many
New York City subways are extremely packed in rush hours, the sentence in (20a), which is adapted from
Nickel (2012: (20c)), still does not allow a weak generic reading. A good number of roads in the countryside
are straight in reality, but (20b) still does not express a true proposition. Even when 40% of the diamonds
in the stock of the relevant international jeweler is pure, (20c) cannot be taken to be true. A considerable
percentage of Americans have a height of (over) 6 feet, probably comparable to, or even more than, the
percentage of good sailors in the Dutch population, but the sentence in (20d) does not have a weak generic
meaning. Given the distinction among different types of (gradable) predicate, 12 Cohen’s analysis does not
offer any insight on the lexical restriction, and as such, leaves an important pattern open and unexplained.
All else being equal or comparable, a theory that can account for our observation regarding the behavior of

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7 The sentences in 18(a-b) are due to Nickel (2012).
8 Nickel (2012) claimed that weak generic readings “aren’t available for all generics with absolute gradable predicates” (p.
399). However, all the absolute gradable adjectives he considered happens to be associated with a maximum standard.
9 Not all native speakers of (American) English that I consulted share the judgment, an instance of interspeaker variation that
I have to leave to future research.
10 The sentence in (19b) is due to Mats Rooth (p.c.). I thank him for this example sentence as well as useful discussion surroun-
ding some other sentences in (18-19).
11 I use the narrow, Kennedian view that absolute adjectives do not have contextual standards. Recently, there has been a
thread of research that claims contextual standards to be also available for such gradable adjectives as used in (19) and (20)
(McNally 2011, Toledo and Sassoon 2011). The latter line of research, in fact, shifts to contextual notions like comparison class
the burden of accounting for the distinctions with regard to standard among different types of gradable predicate.
12 I should admit that judgment on “unfamiliar” weak generic sentences may be subtle at times. In the very least, I hope that
the prudent reader would agree with the contrast that I have observed between the sentences in (18-19) and those in (20), in that
the former group are more amiable to have weak generic readings than are the latter group.
different types of (gradable) predicate in weak generic sentences would be more preferable.\(^\text{13}\)

(20) a. Buses in New York City are full of passengers.
   b. Roads in the countryside are straight.
   c. Diamonds sold by that international jeweler are pure.
   d. Americans are 6-foot tall.

### 3.3 A distributive degree comparison approach

Nickel’s (2012) analysis of weak generic sentences was in large part motivated by two observations that I have already touched upon at the end of last sub-section when I discussed Cohen’s probability-based approach. For the PRP sentence, the first observation is that Cohen’s analysis does not consider those Dutchmen whose sailing skills are not good enough to qualify as “good sailors” (i.e., individuals with good sailing skills) based on the (singular) contextual standard. According to Nickel (2012: 401), the truth condition of the PRP sentence is “sensitive not only to facts about the sailors that exceed the contextually salient standard required for the evaluation of a sentence of the form \(x \text{ is a good sailor}\) (where \(x\) is replaced by a name for a particular person), but also the sailors that fall below that standard.” The second observation has to do with the behavior of different types of (gradable) predicate in weak generic sentences. Nickel (2012) postulated that weak generic sentences of the form \(A\text{s are } P\) should be interpreted in a similar fashion to the distributive reading of such degree sentences as (21a) (cf., Kennedy 2007). The distributive reading of (21a) does not require every member of John’s family to be taller than one single common contextual standard of being tall. Rather, in that reading, the sentence is true when every member of John’s family is tall with respect to the standard for the comparison class that \(s/he\) belongs to (adult men for John the father, adult women for Mary the mother, teenage girls for Elizabeth the daughter, and so on). The idea is represented in (21b), in which the subscript \(i\) indicates the comparison class that an individual belongs to, and “Deg\(_{\text{height}}\)” stands for degrees on the dimension of height.

(21) a. Everyone in John’s family is tall.
   b. \(\forall x\cdot \text{Member-of-John’s-Family}(x)\)\((\text{Deg}_{\text{height}}(x) \geq \text{STND}(x))\)

Nickel (2012) extended the idea of distributive degree comparison to weak generic sentences, and proposed that evaluating the PRP sentence requires considering how well each sub-group of Dutch sailors can sail in comparison to the contextually-determined standard of sailing skills appropriate for that sub-group. According to his idea, in order for the PRP sentence to be true there need to be \(\text{GEN}\)-many Dutchmen in each sub-group whose sailing skills exceed the contextual standard of sailing skills appropriate for that sub-group. This idea is formally represented in (22), where the subscript \(i\) indicates the partition that an individual \(x\) belongs to. The shorthand “Dutch sailor” stands for “Dutchmen with any non-zero level of sailing skills.”

(22) \(\text{[gen}(x)\cdot \text{Dutch sailor}(x)] \cdot \text{Deg}_{\text{good.sailor}}(x) \geq \text{STND}(x))\)

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\(^\text{13}\) As a side note, the restriction on the types of (gradable) predicate in weak generic sentences may suggest that a capacity-based analysis of weak generic sentences (i.e., holding the PRP sentence means something like “If properly trained/if he tries ..., a Dutchman will/would sail well.”) is not desirable. It has been claimed in the literature that a subset of nominal phrases can have a capacity reading in certain contexts. However, I do not see how different types of (gradable) predicate can “license” or “ban” the capacity reading (if any) of bare plurals appearing in weak generic sentences.
3.4 Problems with the distributive degree comparison approach

Obviously, Nickel’s analysis requires evaluating every partition of the population denoted by the bare plural subject of a weak generic sentence with respect to an appropriate contextual standard for that partition. The PRP sentence is true “so long as within each subdivision according to skill, the Dutch sailors in that subdivision reach a skill level that exceeds the standard appropriate for that subdivision” (Nickel 2012: 403). This requirement, however, makes too strong predictions. For more accessible intuition, let us take the contemporary weak generic sentence in (23) for example. Presumably, many Brazilians play soccer. It is very likely that though the top five partitions – out of a total of seven partitions – of those Brazilians who can play soccer (“Brazilian soccer player” for short) have better soccering skills than their respective international counterparts, Brazilian soccer players whose soccering skills fall in the bottom two partitions somehow underperform their international counterparts. Nickel’s analysis would predict the sentence in (23), intended for a weak generic reading, to be false in this scenario, because not all partitions of the Brazilian soccer-playing population generally exceed the corresponding standards. However, according to the native speakers of (American) English that I consulted, the sentence is true (for most speakers), or at least not necessarily false (for the other speakers), especially when the bottom two partitions do not account for a large proportion of Brazilian soccer players. The truth of the sentence only requires a sufficient number – which is to be specified shortly – of Brazilian soccer players to play better than their international counterparts.

(23) Brazilians are good soccer players.

Second, Nickel (2012) did not explicate how to partition Dutch sailors with respect to their sailing skills. He seemed to leave this important aspect of his analysis to contextual specification. Hence, his analysis allows the partitioning to be very coarse or very fine-grained. This lack of specification invites potential problems. When there is a large variation in terms of sailing skills within some coarse partition of Dutch sailors, the coarse partitioning of the Dutch sailor population and of the international counterpart may verify the PRP sentence, but a finer partitioning whereby the large internal variation within the original coarse partition becomes relevant and prominent would falsify it. This amounts to saying, rather undesirably, that the PRP sentence does not have consistent truth conditions. Moreover, Nickel (2012) cannot avoid this problem by simply claiming that the Dutch sailing-knowing population can only be bipartitely partitioned in accordance with the contextual standard of having good vs. “not good” sailing skills. Doing so would be equivalent to requiring those Dutchmen who know how to sail and have good sailing skills and those Dutchmen who know how to sail and do not have as good sailing skills to both sail better than their corresponding standard. This requirement is too strong and brings us back to the previous problem.

Third, neither absolute gradable predicates (e.g., full and dirty) nor non-gradable predicates (e.g., locked and six feet tall) have contextual standards that can co-vary with a higher binding GEN operator. Nickel’s (2012) analysis would, as he actually did, predict that non-gradable and absolute standard gradable predicates cannot license weak generic reading. However, the prediction is only partly borne out. As our discussion surrounding the sentences in (18-20) has indicated, whether a predicate can yield a weak generic reading is actually more complicated than Nickel observed in his paper. Although Nickel’s prediction holds for maximum standard absolute gradable predicates and non-gradable predicates, it does not hold for non-maximum standard absolute gradable predicates.

4 Partitioning and degree comparison

The discussion in the previous section suggests that a more satisfactory analysis than Cohen’s and Nickel’s should be sought for weak generic sentences. At the same time, one should note that in spite of the
shortcomings noted above with Cohen’s and Nickel’s proposals, the two analyses have their own analytic merits. Most importantly, as I will show shortly, the strengths of one analysis can help remedy the problems of the other. Cohen’s mathematical probabilistic proposal rightly makes reference to two alternative populations: (i) the population alternative to the denotation of the bare plural subject of the weak generic sentence, and (2) the population alternative to the denotation of the predicate of the weak generic sentence. I think the use of alternative sets in analyzing weak generic sentences nicely captures the correct observation that these sentences “distinguishes[es] the subject referent from other entities that might belong to the same category” (Krifka et al., 1995: 83). The evaluation of the PRP sentence, for instance, requires considering not just how well Dutch sailors are able to sail, but how well international sailors can sail, as well as how sailing skills within each group are distributed. Consequently, an adequate analysis of weak generic sentences needs to make reference to alternative sets. Hence, I will incorporate the notion of alternative set in the proposal that I develop. However, this notion serves a different purpose in my analysis than does in Cohen’s. In my analysis, alternative sets are not used to calculate conditional probabilities. Rather, for the PRP sentence (for instance), they are primarily used to partition the Dutch population and the international population so that an appropriate sub-group within each population can be singled out to make degree comparison.

Nickel’s analysis, on the other hand, correctly makes recourse to the insight that the interpretation of weak generic sentences involves degree comparison. I postulate that association with different degrees of satisfying the predicate is precisely what “distinguishes the subject referent from other entities that might belong to the same category” (ibid). Evaluating the PRP sentence needs to compare how well (certain partitions of) the Dutch sailor population can sail to how well (the corresponding partitions of) the international sailor population can sail. Thus, besides alternative set, another component of an adequate semantic analysis of weak generic sentences should be degree comparison.

The analysis that I would like to develop precisely combines the merits of Cohen’s and Nickel’s proposals, by making recourse to degree comparison in the context of alternative sets. To begin with, I follow Nickel (2012) to assume that weak generic sentences are subject to the same general tripartite quantificational interpretation scheme as “regular” generic sentences (24). This tripartite structure has been used as a powerful analytic tool to analyze quantificational sentences in general, including generic sentences. Weak generic sentences, special as they may appear at first blush, are actually subject to the same interpretation mechanism as other generic sentences.

(24) GEN (x₁, x₂, … xₙ) [restrictor] (matrix)

After we take the tripartite structure as in (24) as given for interpreting generic sentences, the key issue of defining the semantics of weak generic sentences narrows down to addressing the question of which part(s) of the structure contribute(s) the weak reading of weak generic sentences. Without answering this question, the interpretation of weak generic sentences would be hard or even impossible to distinguish from that of “regular” generic sentences, which, of course, is an undesirable consequence.

Of the three components in the tripartite quantificational structure (i.e., GEN, the restrictor, and the matrix), the GEN operator (alone) cannot be responsible for the weak reading of weak generic sentences. For if so, we would have to assume there to be a weak GEN and a “regular” GEN. Doing so would invite many conceptual and empirical problems. For example, what determines whether the GEN operator associated with a particular generic sentence receives a weak or “regular” interpretation? Are generic sentences always ambiguous between two readings of different quantificational strengths? This does not seem to be the case. In addition, by Occam’s razor, treating GEN as being ambiguous is less desirable than giving GEN a uniform denotation (if possible).

It is worthwhile to note here that several interpretational distinctions in the generic domain have been attributed to the flexible characterization of the GEN operator, but all these definitions of GEN are too strong to capture the weak reading of weak generic sentences. Take Greenberg (2007) for example. She claimed that the GEN operator can be used with different degrees of vagueness in terms of quantification over entities or situations. At the same time, she specified that quantification must hold of the majority of relevant entities/situations. This “majority” requirement means that Greenberg’s use of GEN, as it is, cannot be
extended to weak generic sentences: as a weak generic sentence, the PRP sentence does not require the majority of contextually relevant Dutchmen to be good at sailing. In a different analysis, Krifka et al. (1995) extended Kratzer’s (1981) analysis of modality to the GEN operator. In particular, they used the potential variability in the ordering source used in modal semantics to account for the various potential flavors of generic sentences. However, to the best of my understanding, variability in modal flavors of generic sentences does not amount to varied strengths in generic sentences, and consequently cannot provide a solution to the weak quantification observed with weak generic sentences.

A natural next question to ask is whether the matrix (alone) can be held responsible for the weak reading of weak generic sentences. The answer is negative, as well. The matrix in the tripartite quantificational structure in (24) attributes the property denoted by the predicate to individuals that are restricted by the restrictor. Conceptually, the predicate itself should not be able to pick out a proportionally small subset of individuals from the denotation of the subject. Hence, it should not be held responsible for the weak reading. Otherwise, one would expect that the sentences in (25), whose predicate is the same as that of the PRP sentence, to have a weak generic reading also, contrary to fact (cf., Krifka et al. 1995).

(25) a. The Dutchman is a good sailor.
   b. A Dutchman is a good sailor.

Anticipating further discussion in this section and taking Nickel’s analytic insight of degree comparison as given, the interpretation of weak generic sentences involves degree comparison between (certain partitions of) the population denoted by the subject and (the corresponding partitions of) the contextually relevant alternative population. Degree comparison, on its own, does not contribute the weak reading of weak generic sentences. The sentence in (26), for example, is comparable to the PRP sentence in that it has a bare plural subject and involves overt degree comparison, but it cannot receive a weak generic reading. Because the matrix, which contributes predication, is the only component in the tripartite structure in (24) that specifies degree comparison, this discussion amounts to saying that the matrix does not contribute the weak reading of weak generic sentences.

(26) Lions are bigger than wolves.

Now that the GEN operator and the matrix have both been ruled out as being responsible for the weak reading of weak generic sentences, a natural move is to stipulate that the weak reading is encoded in, and contributed by, the restrictor. At this point, it is helpful to compare a “regular” generic sentence with a weak generic sentence. The interpretation of the “regular” generic sentence in (27a), for instance, is given in (27b) (Krifka et al. 1995). The GEN operator in (27b) quantifies over a domain that includes all (normal) potatoes. Given that the restrictor is taken to be responsible for the weak reading of a weak generic sentence, the GEN operator in the semantics of a weak generic sentence cannot quantify over a domain that contains all (normal) members in the denotation of the subject. Otherwise, the interpretation of a weak generic sentence would be indistinguishable from that of a “regular” generic sentence.

(27) a. Potatoes contain vitamin C.
   b. GEN(x) [potato(x)] (contain-vitamin C (x))

Hence, in order to get the weak reading of weak generic sentences, I think the best possible route is to restrict the domain of entities over which the GEN operator quantifies. By way of providing the quantification domain for the GEN operator, the restrictor specifies an appropriate proper subset of the entities in the denotation of the subject, and the corresponding proper subset from the set of alternatives to the denotation of the subject. The degree comparison relation furnished by the matrix holds of the two restricted subsets of entities in a generic manner. The weak reading of weak generic sentences results in, because the denotation of the subject presumably is a (much) bigger superset of the restricted subset associated with the subject.
That is, the majority of members in the superset are actually ruled out by the restrictor and are not subject to quantification by the \textit{GEN} operator.\footnote{Regarding possible restrictions on the quantification domain for generic sentences in general, the interested reader can refer to such scholars as Kadmon and Landman (1993), Kripka et al. (1995), and Greenberg (2007) for discussion. In this paper, I abstract away from discussing the exact mechanism of such domain restriction.} Hence, it is not relevant whether they satisfy the predicate or not. To put it in another way, being ruled out by the restrictor means that they do not satisfy the predicate. This contrasts with “regular” generic sentences and many other cases of predication, where the predication holds of all, most, or at least proportionally many entities in the denotation of the subject. It is precisely this contrast that gives rise to the weak reading for weak generic sentences.

Thus, the interpretation of weak generic sentences comes down to the task of determining which proper subset of the subject denotation is the actual domain of quantification for the \textit{GEN} operator. Let us take the PRP sentence again. The restricted Dutch population in the domain of quantification cannot be the intersection of the set denoted by \textit{Dutchmen} and the set denoted by \textit{sailor}. For the truth of the PRP sentence does not require Dutch sailors to generally sail better than international sailors, or to sailor better than some standard of sailing skills associated with the international sailor population. Otherwise, we would expect the sentence in (28) to be able to have exactly the same weak generic meaning as the PRP sentence, contrary to fact.

\begin{equation}
\text{(28) Dutchmen who know how to sail are good sailors.}
\end{equation}

Hence, the relevant Dutch population in the quantification domain should be an even smaller set than the set of all Dutchmen who know how to sail (recall that I have been using “Dutch sailor” to refer to this population).\footnote{My argumentation with regard to the quantification domain for the \textit{GEN} operator associated with weak generic sentences is more philosophically-oriented than based on empirical linguistic data. I leave the (important) task of locating empirical evidence in support of the analysis to future research.} The linguistic contexts in the PRP sentence specify only one prominent, natural, and coherent means to derive this even smaller subset, viz., based on the standard of having good sailing skills. The \textit{GEN} operator quantifies over Dutchmen whose sailing skills are good with respect to the comparison class of all Dutch sailors. This Dutch population, in the domain of quantification, can be defined as in (29), where \text{STND}(\text{good Dutch sailor}) is the standard of having good sailing skills \textbf{within} the Dutch sailor population. When determining whether or not a Dutchman is a good sailor among his compatriots, it is intuitively wrong to use the whole Dutch population as the comparison class, because every Dutchman who can sail may be considered to have good sailing skills if they are compared to those Dutchmen without any sailing skills at all. It would be even more wrong to use the Dutch and international combined population as the comparison class. Whether a Dutchman is considered to be a good Dutch sailor should be evaluated with respect to the Dutch sailor population.

\begin{equation}
\text{(29) Dutch sailor(x) \land Deg_{\text{good sailor}}(x) \geq \text{STND}(\text{good Dutch sailor})}
\end{equation}

The next task is to decide what good Dutch sailors in the quantification domain should be compared to. By the simple logic of “compare apples to apples”, they should be compared to the corresponding international population who have good sailing skills (“good international sailors” for short) – good as evaluated with respect to sailing skills of the international sailor population. That is, the restrictor specifies (presumably small) subsets of Dutch and international populations in (30a-b), which are semi-formally represented in (31a-b). The two groups are compared with respect to how well they sail (i.e., their sailing skills). The degree comparison relation specified by the matrix is given in (32).

\begin{equation}
\begin{aligned}
\text{(30) Domains of quantification:} \\
\text{a. Dutchmen whose sailing skills are good with respect to the Dutch-internal standard of having good sailing skills} \\
\text{b. International sailors whose sailing skills are good with respect to the international standard of having good sailing skills}
\end{aligned}
\end{equation}
(31) a. Dutch sailor (x) ∧ Deg_{good sailor}(x) ≥ stnd(good Dutch sailor)
    b. Int’l sailor (y) ∧ Deg_{good sailor}(y) ≥ stnd(good int’l sailor)

(32) Deg_{sailing skills}(x) > Deg_{sailing skills}(y)

Before the components in (31-32) are assembled together to define the semantic meaning of the PRP sentence, a few words are in order regarding what the GEN operator means. Farkas and Sugioka (1983), Chierchia (1995), and Kratzer (1995) all took GEN to mean essentially “generally, always” and to be an unselective binder that can bind world variables, individual variables, and so on. By contrast, Krifka et al. (1995) and several other researchers assumed an intensional operator analysis of the operator, whereby GEN is analyzed as an unselective universal quantifier that is roughly paraphrasable as ‘must.’ The interested reader can refer to Mari et al. (2013) for a review of the two approaches. As far as I can see, which definition of GEN I take does not affect the analysis that I am developing here for weak generic sentences. For ease of exposition, however, I will adopt the former approach in the rest of this paper.

Now piecing everything together, the precise meaning of the PRP sentence is given in (33). In prose (33) says that the PRP sentence is true if and only if: those Dutchmen who can sail (i.e., “Dutch sailor”) and who are good at sailing (i.e., “good sailor”) in comparison with the Dutch-internal standard of being good at sailing and those international citizens who can sail and who are good at sailing in comparison to the international standard of being good at sailing are such that the former population generally have better sailing skills than the latter population. It is obvious that only a subset of the Dutch sailor population (and a subset of the international sailor population, for that matter) is directly relevant for evaluating the PRP sentence. Compared to the entire Dutch population, this subset is presumably small in proportion. This, I think, is where the weak reading observed with the PRP sentence comes from. The matrix component in (33) involves comparison of sailing skills between the relevant Dutch and international sailor populations, which is inspired by Nickel’s (2012) analysis.

(33) GEN(x, y) [Dutch sailor (x) ∧ Deg_{good sailor}(x) ≥ stnd(good Dutch sailor) ∧ international sailor (y) ∧ Deg_{good sailor}(y) ≥ stnd(good international sailor)] (Deg_{sailing skills}(x) > Deg_{sailing skills}(y))

The notion of “alternative set” can be employed to provide more formal definitions for Dutch sailor and international sailor, by making use of elements that are immediately available from the surface form of the PRP sentence (34).17 Dutchmen denotes a set, of type <et>, containing people of Dutch nationality. Alternatives to an entity of type τ are type τ, as well; and the alternative set to that entity is of type < τ, t> (Rooth 1985). Hence, the alternative set to the denotation of Dutchmen (i.e., ALT(Dutchmen)), of type <et>, is a set of sets that contains the set of Germans, the set of Belgians, the set of Egyptians, and so on. At the same time, evaluating the PRP sentence involves comparing certain partitions of Dutch sailors to corresponding partitions of international sailors as a whole, so there is no need to distinguish different sets of international people based on their (non-Dutch) nationalities. These different sets of international people can be trivially conjoined together, so that the alternative set to Dutchmen is the whole international population. That is, the alternative set to Dutchmen is harmlessly “typed downward” from <et>,t> to <et>. The predicate good sailor denotes a set of individuals whose sailing skills are considered good with respect to a contextual standard, which, in turn, is determined against a comparison class (Dutch sailors, or international sailors). The alternative set to good sailor (ALT(good sailor)) can likewise be construed as a set that contains individuals with all non-zero levels of sailing skills. People who do not know how to sail at all are excluded from this alternative set.

17 Because in this paper I do not address the structural representation of weak generic sentences, how these alternative sets are made available syntactically remains an open question.
(34) a. [[Dutch sailor]] = [[Dutchmen]] ∧ ALT(good sailor), where good sailorship is evaluated within the Dutch sailor population.
b. [[international sailor]] = ALT(Dutchmen) ∧ ALT(good sailor), where good sailorship is evaluated within the international sailor population.

That is, the denotation of the subject Dutchmen is conjoined with ALT(good sailor) to yield a set that contains all Dutchmen who can sail. ALT(Dutchmen) is conjoined with ALT(good sailors) to yield a set that contains all international people who can sail.

Furthermore, good Dutch sailor can be trivially defined by conjoining the denotations of Dutchmen and good sailor (35a); and good international sailor can be defined by conjoining the alternative set to Dutchmen and good sailor (35b). Replacing Dutch sailor, international sailor, etc. in (33) with the semantic denotations in (34-35) would yield the final formal definition of the semantic meaning of the PRP sentence, which, however, I will omit so as to avoid giving unnecessarily lengthy formal representations.

(35) a. [[good Dutch sailor]] = [[Dutchmen]] ∧ [[good sailor]], where good sailorship is evaluated within the Dutch sailor population.
b. [[good international sailor]] = ALT(Dutchmen) ∧ [[good sailor]], where good sailorship is evaluated within the international sailor population.

5 Theoretical advantages

Now that I have laid out my analysis of weak generic sentences, in this section I will take up the remaining task of showing how my analysis avoids the challenges observed with Cohen’s and Nickel’s proposals discussed in section 3. Cohen’s (1999, 2001) analysis – at least implicitly – uses the same standard of having good sailing skills for the Dutch population as for the alternative international population. It does not consider how exactly sailing skills are distributed within each of the two populations, which causes problems. In my analysis, the Dutch-internal standard, as well as its international counterpart, of having good sailing skills are determined relative to the comparison class within the respective populations. The distribution of sailing skills of Dutch sailors and that of international sailors, two comparison classes, both matter for deciding their respective standards of having good sailing skills. When Dutch sailors who sail badly in Cohen’s sense (i.e., with respect to the common standard for Dutch and international sailors combined) account for a large proportion of Dutch sailors, the Dutch-internal standard of being good at sailing is “dragged” low. In this scenario, Dutch sailors who are considered good at sailing within the Dutch sailor population do not necessarily sail better than their international counterpart. When the number of such Dutch sailors is contextually great, there may be no GEN-many good Dutch sailors who sail better than good international sailors, and the PRP sentence would be false in such scenarios.

In section 3, I have shown that Cohen’s (1999, 2001) analysis would wrongly predict the PRP sentence to be necessarily true in the scenario depicted in Figure 1. This incorrect prediction does not arise in my proposal. My analysis, as represented in (33), involves comparing the sailing skills of good Dutch sailors to the sailing skills of good international sailors. Moreover, good Dutch sailors are evaluated against the Dutch-internal standard of being good at sailing, and good international sailors against the corresponding international standard. Determining a contextual standard, typically speaking, requires a comparison class to provide some frame of reference (Kennedy 2007 and many others). The Dutch standard of being good at sailing is determined with respect to the comparison class that contains all Dutchmen with some non-zero degree of sailing skills, and likewise for the international standard. The distribution of sailing skills of these Dutchmen has an effect on where the Dutch-internal standard of being good at sailing falls and hence who can count as good Dutch sailors. This also holds for the alternative, international population. Therefore, although my analysis of the PRP sentence only directly concerns those who can be labeled as good sailors among Dutch sailors and international sailors based on their relevant, respective standards, whether the sentence is true actually has to do with the distribution of sailing skills of Dutch sailors and how the distri-
distribution compares to the distribution of sailing skills of international sailors.

If international sailors of the “OK” category account for only a small proportion (say 10%) of all international sailors, and if in such a scenario GEN-many Dutch sailors whose sailing skills are good with respect to their fellow Dutch sailors sail better than their international counterparts, then the PRP sentence would be true. This scenario is illustrated in Figure 3. On the other hand, international sailors of the “OK” category may account for a large proportion (say 75%) of international sailors, and in such a scenario the international standard of having good sailing skills may (i.e., not necessarily so) be “elevated” well beyond the Dutch standard. In such cases there are very likely no GEN-many good Dutch sailors whose sailing skills exceed their international counterparts. If this indeed turns out to be the case, the PRP sentence would be false (Figure 4).18 The key point is that the Dutch and international standards of having good sailing skills are determined against two different comparison classes and as such, are separate from each other.

<table>
<thead>
<tr>
<th>Dutch</th>
<th>30% good</th>
<th>70% bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative</td>
<td>15% good</td>
<td>10% OK</td>
</tr>
</tbody>
</table>

Fig. 3: Polarized distribution of Dutch sailors; “semi-polarized” distribution of int’l sailors

<table>
<thead>
<tr>
<th>Dutch</th>
<th>30% good</th>
<th>70% bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative</td>
<td>15% good</td>
<td>75% OK</td>
</tr>
</tbody>
</table>

Fig. 4: Polarized distribution of Dutch sailors; “uneven” distribution of int’l sailors

I would like to stress here that in my analysis of the PRP sentence, what matters is the numbers (i.e., whether GEN-many or not), as well as the sailing skills, of good Dutch sailors and good international sailors – good as evaluated against their respective comparison classes. These two factors, in turn, have to do with not only the percentages of good, OK, and bad sailors within the respective comparison classes, but also the distribution of sailing skills within these partitions. This multi-layered approach sets my analysis apart from Cohen’s (1999, 2001), in allowing for more fine-grained possibilities, instead of indiscriminately treating the PRP sentence to be true in the scenarios depicted in Figures 3-4. Take the scenario in Figure 4 for example and consider further possible sub-scenarios. Assume first that even the good international sailors – despite that in Figure 4 they are considered good relative to the same standard as for good Dutch sailors (cf., footnote 18) – are just slightly better than the OK international sailors. At the same time, the good Dutch sailors are extremely good at sailing. In this case, the good Dutch sailors will generally beat the good international sailors, because the Dutch sailors are extremely good by human standards. Then, the PRP sentence would be true in this sub-scenario. However, keeping the same percentage distribution in Figure 4 constant, if we reverse the distribution of the good sailors (i.e., good international sailors are extremely good, but good Dutch sailors, though still considered good, are near mediocre in comparison), we would predict the opposite truth value for the PRP sentence. My analysis is not solely dependent on the percentages. It also makes reference to degree comparison, as well as to two comparison class-specific standards used to pick entities under comparison. Thus, my analysis can account for the above change in truth value of the PRP sentence.19

Moreover, according to my analysis, the semantic interpretation of weak generic sentences makes reference to the GEN operator. According to von Fintel (1997: 33), the GEN operator “is lexically specified to

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18 To keep in line with the scenario depicted in Figure 1, Cohen’s (1999, 2001) assumption is held in Figures 3 and 4 that the standard for being good sailors (and that for being bad sailors, for that matter) is the same for the Dutch and international sailor populations. My prose discussion surrounding the two figures, of course, treats Dutch standards as being separate from the corresponding international standards, as my analysis concerns internal distributions of sailing skills within each population (“comparison class”).

19 I thank an Open Linguistic reviewer for helpful comments which lead to the discussion given in this paragraph.
trigger a Homogeneity Presupposition.” That is to say, the use of the GEN operator signals a presupposition that entities in the domain of quantification behave uniformly with respect to the property specified in the matrix. Von Fintel argued that generic bare plural sentences obey the principle of the Excluded Middle (36).

\[(36) \text{GEN} [p](q) \iff \neg \text{GEN} [p](\neg q).\]

With this independently proposed theorem, my analysis can explain why the sentence Dutchmen are bad sailors cannot be true when the PRP sentence is true. Obviously, Dutchmen are bad sailors entails that Dutchmen are not good sailors. By Excluded Middle in (36), the latter generic proposition further entails that it is not the case that generically Dutchmen are good sailors. This contradicts the original assumption that the PRP sentence is true. Hence, Dutchmen are bad sailors must be false when the PRP sentence is true.

Third, Nickel’s (2012) analysis requires partitioning all Dutch sailors based on how well they can sail, and evaluating the PRP sentence makes reference to each and every partition. In addition, Nickel did not specify how to partition Dutch sailors with respect to their sailing skills. The partitioning can be arbitrarily coarse, arbitrarily fine-grained, or anywhere in between. The first two problems I discussed with Nickel’s analysis in section 3.4 arise exactly from the requirement of exhaustive partitioning combined with the lack of specification regarding how to partition. My analysis does not require exhaustive partitioning, nor does it allow random partitioning. As such, my analysis avoids the first two problems that I noted with Nickel’s analysis.

Fourth, different from Nickel’s (2012) proposal, my analysis of weak generic sentences does not involve a standard that co-varies with a higher operator. What matters most is the “>” relation between the sailing skills of good Dutch sailors and the sailing skills of their international counterparts. Therefore, my analysis predicts weak generic sentences to be available for any predicate whose semantics is compatible with the “>” relation. Such predicates include relative gradable predicates (e.g., bad and expensive) and fixed, non-maximum absolute standard gradable predicates (e.g., wet, dirty, and lemon). As far as semantics is concerned, maximum standard absolute gradable predicates are not compatible with the “>” relation and should not be able to license weak generic reading (Kennedy 2007, Kennedy and McNally 2005). Non-gradable predicates cannot license weak generic reading either, but for a different reason: they do not involve standards to begin with. The predictions are all borne out in my analysis, as shown by the sentences in (18), (19) and (20).

6 Concluding remarks

Weak generic sentences have received a good amount of attention in formal semantics and philosophy of language literature. In this paper I reviewed two major previous proposals: Cohen’s (1999, 2001) mathematical probability approach and Nickel’s (2012) distributive degree comparison approach. Both analyses have analytic strengthens, and yet face serious empirical challenges and theoretical flaws. At the same time, they are complementary of each other. My analysis combines the two approaches by making use of alternative set from Cohen’s analysis and degree comparison from Nickel’s. Under my analysis, the semantics of the famous Port Royal Puzzle sentence requires that GEN-many Dutch sailors whose sailing skills are good relative to their fellow Dutch sailors sail better than international sailors whose sailing skills are good relative to other international sailors. I showed that my analysis can successfully avoid the problems with Cohen’s and Nickel’s analyses.

Nevertheless, there are still important issues regarding weak generic sentences that I did not address in this paper, due to space and other pragmatic reasons. For instance, my analysis did not touch upon the syntactic representation of weak generic sentences, or the relations and interface between syntactic representation and semantic interpretation. Moreover, my analysis did not provide an explicit account of the observation that weak generic sentences can only occur with bare plural subjects, but not with indefinite singular subjects. I will leave such issues to future research.

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20 Whether pragmatics of gradability can play a role is left to future research (cf., footnote 11).
Acknowledgments: The basic idea pursued in this research project was inspired by conversations with Liangyue Lu, to whom I owe a special debt of gratitude. I also would like to thank the following scholars for their invaluable comments and questions at various stages of this research: Dorit Abusch, Roni Katzir, Craige Roberts, Mats Rooth, Judith Tonhauser, and John Whitman. My sincere thanks also go to an Open Linguistics reviewer, whose detailed and insightful comments have helped improve this paper significantly. Preliminary versions of the research were presented at the 15th Sinn und Bedeutung conference at Universität des Saarlande, the 38th Berkeley Linguistics Society, as well as the Semantics-Syntax (“Synners”) Discussion Group at the Ohio State University. I received constructive suggestions from the audiences at all of these occasions. Of course, all remaining errors and inadequacies are my own responsibilities.

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