Incremental Comparison

Introduction This paper develops an analysis of the semantics of incremental readings of the comparative morpheme *-er*/*-more*. To our knowledge, this construction has not yet been analysed in the literature. Incremental comparison with *-er* is illustrated in sentences (1) and (2):

(1) Give me more coffee. [context: you just gave me a cup of coffee and I drank it all]

(2) Five customers bought a laptop yesterday, and one more customer bought a computer this morning.

In its incremental reading, the request in (1) is satisfied even if the quantity of coffee that I receive is less than the quantity of coffee that I got before. In the same way, (2) is true even in case only one customer bought a computer this morning. A naive description of the semantic import of comparison in these sentences is that it contributes an assertion that some quantity/degree associated with an eventuality increments a quantity/degree associated with a previous eventuality of the same kind, without necessarily being superior to it. In this sense, (1) and (2) can be contrasted with the corresponding non incremental uses of *er*:

(3) Give me more coffee than you did last time.

(4) One more customer bought a computer this morning than yesterday.

The request in (3), for instance, can only be satisfied if the quantity of coffee that you give me is greater than the quantity of coffee that you gave me previously. Adverbial incremental comparison is also attested in English:

(5) It rained during two hours before the game, and it rained some more after it.

Incremental comparison is constrained by a number of factors. First, the presence of a *than*-phrase blocks incremental readings, as illustrated by the contrast between (1) and (3). Secondly, incremental comparison is not available with all sorts of predicates, as illustrated by (6), and even when available, only one out of several conceivable ways to increment a degree might be attested, as in (7)

(6) The water was quite warm 10 minutes ago, and it is warmer now.

(7) The temperature rose by 4C yesterday afternoon, and it's going to rise some more this afternoon.

Absence of incremental comparison: (6) entails that the water is warmer now than it was 10 minutes ago – no incremental reading is available at all in this case. *Restricted incremental comparison:* (7) has an incremental reading according to which the temperature might rise by less than 4C this afternoon. And it might even be the case that the temperature fell down during the night, and rose back again before now. However, it has to be the case that the temperature rises from the degree it had reached yesterday afternoon – not from a lower degree. Hence, no incremental reading is attested in which the temperature rose from 10C to 14C yesterday afternoon, and rose from 8C to 10C today. In contrast, the non incremental comparison in (8) allows a reading in which the temperature rose from 10C to 14C yesterday afternoon, and from 6C to 12C today:

(8) The temperature rose more today than it did yesterday afternoon.

Analysis. A semantics of comparison in the style of Hackl (2000) and Heim (2001) is assumed. DegPs headed by the non-incremental comparative morpheme *-er* denote generalized quantifers of degrees, of type $\langle\langle d, t\rangle, t\rangle$. Nominal comparison relies on the insertion of a silent MANY operator, that denotes a parametrized determiner of type $\langle d, \langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle\rangle$. A specific lexical entry $\textit{-er}_{inc}$ is given for the incremental comparison operator, where $\otimes$ is the mereological overlap relation and $\oplus$ is the mereological sum relation (Krifka (1998)):

(9) $[[\text{er}_{inc}]] = \lambda D_{\langle d,\langle v,t\rangle\rangle}\lambda d\lambda e$: $\underline{\neg e\otimes e' \wedge D(e')(d')}$. $D(e)(d) \wedge D(e\oplus e')(d+d')$

$\textit{er}_{inc}$ combines with a relation between degrees and eventualities D, and outputs a function from a degree *d* and an eventuality *e* to the truth value 1 iff D(e)(d) and D(e⊕e')(d+d') is true. The eventuality *e'* and the degree *d'* introduced in the presupposition (underlined) must be resolved anaphorically: *e'* is a particular eventuality made salient by the context together with its associated

degree *d'*. Taking sentence (2) as an example, *e'* would be a salient event of buying a computer by *d'* = 5 customers yesterday, and D(e⊕e')(d+d') would be the complex event e⊕e' of buying a computer by *d+d'* = 6 customers yesterday and today, *e* being the event of buying a computer today by *d* = 1 customer. What is thus asserted is that the event *e* satisfies the relation $D_{\langle d,\langle v,t\rangle\rangle}$ with the degree *d* and can be summed with *e'* to satisfy $D_{\langle d,\langle v,t\rangle\rangle}$ with the incremented degree *d+d'*. The presupposition also requires that *e* and *e'* don't overlap mereologically. In most cases, this requirement will be statisfied by having *e* and *e'* stand in a strict temporal precedence relation, but in some cases *e* and *e'* can be cotemporaneous or simultaneous, as in the most accessible reading of (11) where the two different states of John owning a house hold at the time of utterance:

(11) John owns a house in Boston, and he owns one more house in New York City.

Syntactic structure of incremental comparisons. *-er*$_{inc}$ is generated either as an adverb or as an NP modifier. It can raise to the specifier of VP, where it can combine with a relation $D_{\langle d,\langle v,t\rangle\rangle}$, in which case it leaves in its base position a trace that is interpreted as a degree variable of type d. (12) and (13) are the LFs of *John ran (some) more* and *More boys came* in their incremental readings (where *ran* is assumed to have been shifted to the type $\langle d,\langle e,\langle v,t\rangle\rangle\rangle$)

(12) $[_{VP}$*er*$_{inc}$ $\lambda d\,[_{VP}$ John $[_{V'}\,[_{V}$ ran] d]]]

(13) $[_{VP}$*er*$_{inc}$ $\lambda d\,[_{VP}\,[_{DP}$ d [MANY boys]] $[_{V}$ came]]]

Absence of incremental comparison: With a than phrase: This follows directly from the type of *er*$_{inc}$. Assuming that than-phrases denote degrees, there is no argument position available for the degree denoted by a than-clause in the lexical entry of *er*$_{inc}$. With predicates like *be warm*. Such predicates resist incremental comparison (cf. (6)) because they are anti-cumulative with respect to their degree argument (cf. definition below). Considering (6) again, let us take two non overlaping states *s'* and *s* such that some body of water was warm to degree *d'* in *s'* and that same body of water was warm to degree *d* in *s*. We can form the sum of *s'* and *s*, *s⊕s'*. However, it is not the case that the degree to which the water is warm in *s⊕s'* is equal to *d+d'*, although there might be other ways of measuring the temperature of the water in *s⊕s'* (for instance, taking the average of *d* and *d'*). The relevant notion of cumulativity is:

(14) $D_{\langle d,\langle v,t\rangle\rangle}$ is cumulative iff $\forall e\forall e'\forall d\forall d'$ [D(e)(d) ∧ D(e')(d')] → [D(e⊕e')(d+d')]

A predicate like *be d-warm* is anti-cumulative:

(15) $D_{\langle d,\langle v,t\rangle\rangle}$ is anti-cumulative iff $\forall e\forall e'\forall d\forall d'$ [D(e)(d) ∧ D(e')(d')] → [¬D(e⊕e')(d+d')]

Incremental comparison built with anti-cumulative relations $D_{\langle d,\langle v,t\rangle\rangle}$ always yield false propositions. Since *-er*$_{inc}$ is homophonous with non incremental *-er*, which can yield true propositions with anti-cumulative properties $D_{\langle d,\langle v,t\rangle\rangle}$, the use of *-er*$_{inc}$ with anti-cumulative $D_{\langle d,\langle v,t\rangle\rangle}$ can never be perceived.

Restriced incremental reading. The restriction on what incremental reading is available in cases like (7) directly follows from our analysis of *-er*$_{inc}$ together with the meaning of verbs like *rise*. According to our analysis, a pair of eventuality and degree (*e*,*d*) such that *D(e)(d)* can increment a pair of eventuality and degree (*e'*,*d'*) such that *D(e')(d')* only if the sum of *e* and *e'* satisfies *D* to the degree *d+d'*, *D(e⊕e')(d+d')*. Let *D* stand for *λdλe.e is an event of temperature-rising to the degree d*. In that case, *D(e⊕e')(d+d')* entails that the temperature rose to the degree *d+d'* in *e⊕e'*. This entails that the difference in temperature between the end of *e* and the begining of *e'* (*δT[End(e)/Init(e')]*) equals *d+d'*. Since by assumption:

(16) δT[End(e')/Init(e')] = d' ∧ δT[End(e)/Init(e)] = d

then *δT[End(e)/Init(e')] = d+d'* entails that the temperature at the begining of *e* equals the temperature at the end of *e'* (ie. *δT[Init(e)/End(e')] = 0*).

References: Hackl, M. 2000. *Comparative Quantifiers*, PhD dissertation, MIT, Cambridge, Mass. Heim, Irene (2001). *Degree operators and scope*. In *Audiatur Vox Sapientiae. A Festschrift for Arnim von Stechow*, eds. Caroline Féry and Wolfgang Sternefeld, 214 - 239. Krifka, Manfred (1998). *The origins of telicity*. In *Events and Grammar*, ed. Susan Rothstein Dordrecht: Kluwer, 197-235.