Conditionals as attitude reports

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Abstract

Most theories of conditionals and attitudes do not analyze either phenomenon in terms of the other. A few view attitude reports as a species of conditionals (e.g. Stalnaker 1984, Heim 1992). Based on evidence from Kalaallisut, this paper argues for the opposite thesis: conditionals are a species of attitude reports. The argument builds on prior findings that conditionals are modal topic-comment structures (e.g. Haiman 1978, Bittner 2001), and that in mood-based Kalaallisut English future (e.g. *Ole will win*) translates into a factual report of a prospect-oriented attitudinal state (e.g. expectation or anxiety, see Bittner 2005). It is argued that in conditionals the antecedent introduces a topical sub-domain of an input modal base (Kratzer 1981) and requires the consequent to comment. The comment is a factual report of an attitude to the topical antecedent sub-domain.

1 INTRODUCTION

In English, conditionals are grammatically unrelated to attitude reports. Conditionals involve auxiliaries, e.g. *will* or *would*, whereas attitude reports involve main verbs, e.g. *believe* or *want*. It is therefore not surprising that most theories do not analyze either phenomenon in terms of the other (e.g. Hintikka 1969, Lewis 1973, 1979, Kratzer 1981, Schlenker 2003, 2004, Maier 2006, Schulz 2007). A few exceptions view attitude reports as a species of conditionals (e.g. Stalnaker 1984, Heim 1992).

Based on evidence from Kalaallisut (Eskimo-Aleut: Greenland), this paper argues for the opposite thesis: conditionals are a species of attitude reports. Bittner (2005) shows that future uses of English *will* and *would* have more than twenty translations in Kalaallisut. Most of them are derivational suffixes introducing prospect-oriented attitudinal states, e.g., expectation (*-ssa*, *-jumaar*), desire (*-ssa*, *-rusuk*, *-juma*), intent (*-niar, -jumaar*), need (*-tariaqar*), anxiety (*-qina*), considering it possible that so-and-so will happen (*-sinnaa*), being certain it won't happen (*-navianngit*), and so on. Instead of grammatical tense, the language has a system of grammatical moods that distinguish currently verifiable facts (declarative, interrogative, or factual) from current prospects (imperative, optative, or hypothetical). In this system futurity is a species of a fact. For example, the English future *Ole will win* translates into the Kalaallisut declarative (1), which asserts that there is a currently verifiable state of expectation that Ole will win. The Kalaallisut attitudinal predicate *-ssa* is impersonal, so the attitude holder is unspecified.

(1)   *Ole   ajugaa-ssa-pu-q.* [1]
    Ole   win-*exp*$^>$-DEC$_{iv}$-3S$_{(T)}$
    Ole will win. (*lit.* expects or is expected to)

The same fact-oriented moods and prospect-oriented attitude suffixes also occur in Kalaallisut conditionals. Both elements are required even in conditionals about the past, such as the famous examples of Adams (1970) (see (2)-(3)). I propose that conditionals, too, are factual reports of currently verifiable attitudinal states. In conditionals about the past these are real states of expectation. They are based on real past events (e.g. the real assassination or real turning point toward a climate of hatred) and project the expected consequences of these events in hypothetical antecedent worlds.

(2)   *Oswald-p   Kennedy   tuqut-sima-nngit-pp-a-gu*
    Oswald-ERG   Kennedy   kill-prf-not-HYP$_\perp$-3S$_\perp$-3S
    inuk-piluk-qat-ata   tuqut-sima-ssa-pa-a.
    man-bad-other-3S$_\perp$.ERG   kill-prf-*exp*$^>$-DEC$_{tv}$-3S$_{(T)}$.3S$_{(\perp)}$
    If Oswald didn't kill Kennedy, then someone else did.

(3)   *Oswald-p   Kennedy   tuqut-sima-nngit-galuar-pp-a-gu*
    Oswald-ERG   Kennedy   kill-prf-not-rem-HYP$_\perp$-3S$_\perp$-3S
    man-piluk-qat-ata   tuqut-sima-ssa-galuar-pa-a.
    man-bad-other-3S$_\perp$.ERG   kill-prf-*exp*$^>$+rem-DEC$_{tv}$-3S$_{(T)}$.3S$_{(\perp)}$
    If Oswald hadn't killed Kennedy someone else would've.

The argument goes as follows. §2 argues that fact-oriented moods introduce the eventuality of the verb as a currently verifiable fact. This has modal as well as temporal implications. Modally, the declarative matrix mood (-DEC) locates the last eventuality of the verb (-*ssa* 'exp$^>$' in (1)–(3)) in the same world as the speech act. Temporally, it locates (the beginning of) this eventuality before the speech act. The participants in the speech act can therefore verify the speaker's assertion that this eventuality is a fact.

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[1] Kalaallisut morphemes are given, in standard orthography minus allophonic variants ([*o*], [*e*], [*ff*] of */u/, /i/, /vv/*), in the underlying form. The surface form is determined by phonological processes, e.g. *nngit-galuar > -nngikkaluar, -ssa-pu > -ssaa*. The glosses are in small caps for inflections (e.g. '-DEC'), lower case for derivational suffixes (e.g. '-not'). Abbreviated glosses: ⊤ = topic, ⊥ = background, att$_{se}$ = attitude *de se*, att$_\perp$ = attitude *de* ⊥, att$^>$ = attitude to prospect, bel = believe, des = desire(d), exp = expect(ed), int = intend(ed), obl = obliged to, pssv = passive, rem = remote from (att-)ideal.

Next, §3 builds on the finding that Kalaallisut counterparts of English *will* are derivational suffixes for prospect-oriented attitudes (Bittner 2005). In (1)–(3) the suffix *-ssa* introduces a state of expectation (-exp$^>$). It is this attitudinal state that is a currently verifiable fact (-DEC). In the default case (1), *-ssa* introduces a state of expectation concerning the consequent state (see Moens and Steedman 1988) of the speech act in the common ground— i.e., of the default perspective point in the default topical modality (cf. Stalnaker 1975, Kaplan 1978). The attitude holder's expectations rank the modal base worlds from most to least expected (Hintikka 1969 modulo Lewis 1981). Within the modal base (the common ground, by default), in the worlds that best fit the attitude holder's expectations Ole wins within the consequent state (verification frame) of this speech act (perspective point). The unspecified attitude holder of this real attitudinal state is likely to be the topic (Ole), or the speaker who is making this prediction.

§4 factors in the modal and temporal context-setting effects of the antecedent clause. Modally, the antecedent updates the input modal base to a topical sub-domain (Haiman 1978, Kratzer 1981, Bittner 2001, Ebert *et al.* 2008). Temporally, it may update the perspective point. For instance, on the salient reading of the conditional attitude report (2), the real state of expectation concerns the consequent state of the real assassination event in the topical sub-domain of the common ground where the assassin is not Oswald. Within this topical sub-domain, in the worlds that best fit the attitude holder's expectations the time of the real assassination is followed by the consequent state (-prf) of an assassination by another agent.

Kalaallisut has an implicitly attitudinal suffix *-galuar* 'rem', which indicates that the world of evaluation is remote from (not amongst) the ideal modal base worlds, ranked by the beliefs or desires of a current center of empathy (usually, the speaker or topic). §5 argues that the salient reading of the counterfactual (3) introduces a real state of expectation concerning the consequent state of a real event, e.g. the enemies of JFK reaching critical mass, in the class of possible worlds where this event is realized. In the topical sub-domain—remote from the sub-domain that best fits the attitude holder's beliefs—JFK is not assassinated by Oswald. In this remote sub-domain the expected worlds are those where within the consequent state of his enemies reaching critical mass JFK is assassinated by someone else.

To explicate these ideas I first introduce *Update with Centering* (UC), so that we can explicitly represent centering-based anaphora in discourse (§1.1–1.2). The Kalaallisut representations proposed in §2–5 can be derived by universal rules of CCG, as shown in §6. Finally, §7 argues that in English too conditionals are a species of attitude reports, albeit with different details.

1.1 *Update with Modal Centering* (UC$_\omega$)

Update with Centering (UC) and sub-logics (e.g. UC$_\omega$) formally represent centering-based anaphora (see Walker *et al* 1998, Bittner 2001) and allow direct composition by universal rules (e.g. CCG of Steedman 2000). To do that, UC combines type logic with deterministic update that maps the input state of information-and-attention (*infotention*) to the output state (adapting Muskens 1995, Veltman 1996). Quantification is analyzed as structured anaphora (a la van den Berg 1996, Brasoveanu 2007), and centering, as list-based anaphora (a la Dekker 1994). That is, a state of infotention is a set of lists of prominence-ranked objects that are currently available for anaphoric reference (*discourse referents*). Since centering devices in natural languages distinguish topical and background referents (see Haiman and Munro 1983, Foley and van Valin 1985), each UC list pairs a current *topic-list* ($\top$-*list*) of ranked referents for topic anaphors (e.g. -3s$_\top$) with a current *background-list* ($\bot$-*list*) of ranked referents for background anaphors (e.g. -3s$_\bot$).

DEFINITION 1 ($\top\bot$-lists, sub-lists, infotention states) Given a set $D \neq \varnothing$:
- $\langle D \rangle^{n,m} = D^n \times D^m$ is the set of *topic-background lists* ($\top\bot$-*lists*) of n topical objects in D and m background objects in D.
- For any $\top\bot$-list $i \in \langle D \rangle^{n,m}$, $\top i = i_1$ and $\bot i = i_2$. Thus, $i = \langle \top i, \bot i \rangle$.
- An n, m-*infotention state* is any subset of $\langle D \rangle^{n,m}$. $\varnothing$ is the *absurd state*.

A state of infotention with n topical and m backgrounded objects can be pictured as a two-dimensional matrix (e.g. (4)). Each row represents a current topic-background list ($\top\bot$-*list*). Each column represents the current set of objects at a given prominence rank, e.g. *primary topic* ($\top_1$), *secondary topic* ($\top_2$), *primary background* ($\bot_1$), etc. An infotention state contains the information that the primary topic is a man and the primary background, a donkey owned by the topical man just in case in every $\top\bot$-list (i.e. row) the $\top_1$-object is a man and the $\bot_1$-object is a donkey owned by the $\top_1$-man.

(4) $\langle \langle d_{\top 1}, \ldots, d_{\top n} \rangle, \; \langle d_{\bot 1}, \ldots, d_{\bot m} \rangle \rangle$ n, m-infotention state

   $\langle \langle d'_{\top 1}, \ldots, d'_{\top n} \rangle, \; \langle d'_{\bot 1}, \ldots, d'_{\bot m} \rangle \rangle$

   $\langle \langle d''_{\top 1}, \ldots, d''_{\top n} \rangle, \; \langle d''_{\bot 1}, \ldots, d''_{\bot m} \rangle \rangle$

   $\vdots$

A piece of discourse deterministically updates the input state of infotention to the output state. Information update adds new test conditions,

eliminating $\top\bot$-lists that fail these tests. For instance, updating (4) with the information that the topical ($\top_1$-)man beats the background ($\bot_1$-)donkey will eliminate any $\top\bot$-lists where this is not the case:

(5) $\langle\langle d_{\top 1}, \ldots, d_{\top n}\rangle, \langle d_{\bot 1}, \ldots, d_{\bot m}\rangle\rangle$ output of information update

$\langle\langle d''_{\top 1}, \ldots, d''_{\top n}\rangle, \langle d''_{\bot 1}, \ldots, d''_{\bot m}\rangle\rangle$

$\vdots$

Attention update extends the input $\top\bot$-lists with newly prominent discourse objects. For instance, if the next sentence begins with the definite subject *The donkey*... then the $\bot_1$-donkey of the input state (5) is promoted to primary topic. That is, each $\top\bot$-list (row) of the input state is re-centered by copying the $\bot_1$-donkey on top of the $\top$-list ($\top_1$-donkey in (6)). Previous topics (other objects on the $\top$-list) are thereby demoted one notch, and no information is lost (cf. recentering-as-overwrite in Stone and Hardt 1999).

(6) $\top_1$ $\top_2$ $\top_{n+1}$ $\bot_1$ $\bot_m$
$\langle\langle d_{\bot 1}, d_{\top 1}, \ldots, d_{\top n}\rangle, \langle d_{\bot 1}, \ldots, d_{\bot m}\rangle\rangle$ output of attention update

$\langle\langle d''_{\bot 1}, d''_{\top 1}, \ldots, d''_{\top n}\rangle, \langle d''_{\bot 1}, \ldots, d''_{\bot m}\rangle\rangle$

$\vdots$

UC_ω is a UC-logic with three semantic types of discourse referents: *propositions* ($\Omega := \omega t$), *worlds* (ω), and *individuals* (δ). That is, non-empty $\top\bot$-lists consist of semantic objects of these types. A $\top\bot$-list is itself a semantic object (of type s), but not a discourse referent ($s \notin \mathrm{DR}(\Theta)$).

DEFINITION 2_ω (UC_ω types). The set of UC_ω *types* Θ is the smallest set such that (i) $t, \omega, \delta, s \in \Theta$, and (ii) $(ab) \in \Theta$ if $a, b \in \Theta$. The subset $\mathrm{DR}(\Theta) = \{\omega t, \omega, \delta\}$ is the set of *discourse referent types* within Θ.

UC_ω-frames allow partial functions because anaphors may fail to denote. The domain of $\top\bot$-lists (D_s) consists of all the pairs of sequences of objects of referent types ($a \in \mathrm{DR}(\Theta)$), including the pair $\langle\langle\rangle,\langle\rangle\rangle$. A model for UC_ω consists of a UC_ω-frame and an interpretation of constant terms.

DEFINITION 3 (UC_ω frames). A UC_ω frame is a set $\{D_a | a \in \Theta\}$ of non-empty pairwise disjoint sets D_a such that (i) $D_t = \{1, 0\}$, (ii) $D_{ab} = \{f | \varnothing \subset \mathrm{Dom}\, f \subseteq D_a\, \&\, \mathrm{Ran}\, f \subseteq D_b\}$, and (iii) $D_s = \cup_{n, m \geq 0} \langle D\rangle^{n, m}$ where $D = \bigcup_{a \in \mathrm{DR}(\Theta)} D_a$.

DEFINITION 4_ω (UC$_\omega$ models). A UC$_\omega$ model is a pair $M = \langle\{D_a|\ a \in \Theta\}, [\![\cdot]\!]\rangle$ such that $\{D_a|\ a \in \Theta\}$ is a UC$_\omega$ frame and for all $A \in Con_a$, $[\![A]\!] \in D_a$.

The basic terms of UC$_\omega$ are variables and non-logical constants. The syntactic definition builds complex terms by means of six standard rules of type logic (i–vi) and four centering rules (vii–x). The centering rule (vii) uses a referent-valued variable to extend the specified sub-list of the input $\top\bot$-list. Rule (viii) builds local anaphors (e.g. $\top a_n$ for the nth object of type a on the $\top$-sublist of the input $\top\bot$-list). Rule (ix) builds global anaphors (e.g. $\top a_n\{I\}$ for the entire set of $\top a_n$-objects on all the $\top\bot$-lists in the input state I). Finally, rule (x) introduces three sequencing operators: *plain* (;), *topic-comment* ($^\top$;), and *background-elaboration* ($^\bot$;).

DEFINITION 5_ω (UC$_\omega$-syntax). For any type $a \in \Theta$ the set of a-terms, *Term$_a$*, is defined as follows:

i. $Con_a \cup Var_a \subseteq Term_a$
ii. $\lambda u_a(B) \in Term_{ab}$, if $u_a \in Var_a$ and $B \in Term_b$
iii. $BA \in Term_b$, if $B \in Term_{ab}$ and $A \in Term_a$
iv. $\neg A, (A \rightarrow B), (A \wedge B), (A \vee B) \in Term_t$, if $A, B \in Term_t$
v. $\forall u_a B, \exists u_a B \in Term_t$, if $u_a \in Var_a$ and $B \in Term_t$
vi. $(A_a = B_a) \in Term_t$, if $A_a, B_a \in Term_a$
vii. $(u_a\ ^\top\oplus B), (u_a\ ^\bot\oplus B) \in Term_s$, if $a \in \mathrm{DR}(\Theta)$, $u_a \in Var_a$, and $B \in Term_s$
viii. $\top a_n, \bot a_n \in Term_{sa}$, if $a \in \mathrm{DR}(\Theta)$ and $n \geq 1$.
ix. $A\{B\} \in Term_{at}$, if $a \in \mathrm{DR}(\Theta)$, $A \in Term_{sa}$, and $B \in Term_{st}$
x. $(A; B), (A\ ^\top; B), (A\ ^\bot; B) \in Term_{(st)st}$, if $A, B \in Term_{(st)st}$

For any variable assignment g, the semantic definition extends the interpretation of constants, $[\![\cdot]\!]$, to all terms, $[\![\cdot]\!]^g$. Rules (i-vi) are standard. (We write '$X \doteq Y$' for 'X is Y, if Y is defined, else X is undefined' and use the von Neumann definition, so $1 = \{\varnothing\}$ and $0 = \varnothing$.) In the centering rule (vii), $(\mathsf{d} \oplus \mathsf{z}) := \langle\mathsf{d}, \mathsf{z}_1, \ldots \mathsf{z}_n\rangle$ for any object d and sequence z. That is, the object $g(u_a)$ is added on top of the specified sublist of the input $\top\bot$-list $[\![B]\!]^g$. In (viii), $(\mathsf{z})_a$ denotes the sub-sequence of type a coordinates of z, and $(\mathsf{z})_n$, the nth coordinate of z. That is, $\top a_n$ (or $\bot a_n$) denotes the nth a-object on the $\top$-list (or $\bot$-list), if there is such an object, and fails to denote otherwise. Rule (ix) says that $A\{B\}$ denotes the *global value* of the anaphor A in state B, i.e. (characteristic function, $^\chi(\cdot)$, of) the set of all the A-objects on the B-lists. In rule (x) a plain sequence $(A; B)$ updates the input state c first with A and then

the result with B, as usual. A topic-comment sequence $(A^{\top}; B)$ reduces to plain $(A; B)$ iff A (*topic-update*) extends the input $\top$-list with at least one object and the top-ranked object is then referred to by $\top a_1$, for some type a, and maintains its $\top a_1$-rank throughout B (*comment*). (List $\mathsf{y} \in D^{m+n}$ *extends* list $\mathsf{z} \in D^n$, $\mathsf{y} > \mathsf{z}$, iff $\mathsf{y} = \langle \mathsf{y}_1,\ldots, \mathsf{y}_m, \mathsf{z}_1, \ldots, \mathsf{z}_n \rangle$.) A background-elaboration sequence $(A^{\perp}; B)$ is defined analogously for $\perp$-lists. (We write '$\mathsf{c}[\![X]\!]^g$' for '$[\![X]\!]^g(\mathsf{c})$', and '$X[Y/Z]$' for the result of replacing every Y in X with Z.)

DEFINITION 6_ω (UC$_\omega$ semantics). For any $M = \langle \{D_a| a \in \Theta\}, [\![\cdot]\!] \rangle$ and g:

i. $[\![A]\!]^g = [\![A]\!]$ if $A \in Con_a$

       $[\![u]\!]^g = g(u)$ if $u \in Var_a$

ii. $[\![\lambda u_a(B)]\!]^g(\mathsf{d}) \doteq [\![B]\!]^{g[u/\mathsf{d}]}$ if $\mathsf{d} \in D_a$

iii. $[\![BA]\!]^g \doteq [\![B]\!]^g([\![A]\!]^g)$

iv. $[\![\neg A]\!]^g \doteq 1\backslash[\![A]\!]^g$

       $[\![A \to B]\!]^g \doteq 1\backslash([\![A]\!]^g\backslash[\![B]\!]^g)$

       $[\![A \wedge B]\!]^g \doteq [\![A]\!]^g \cap [\![B]\!]^g$

       $[\![A \vee B]\!]^g \doteq [\![A]\!]^g \cup [\![B]\!]^g$

v. $[\![\forall u_a A]\!]^g \doteq \bigcap_{\mathsf{d} \in D_a} [\![A]\!]^{g[u/\mathsf{d}]}$

       $[\![\exists u_a A]\!]^g \doteq \bigcup_{\mathsf{d} \in D_a} [\![A]\!]^{g[u/\mathsf{d}]}$

vi. $[\![A_a = B_a]\!]^g = |\{\langle \mathsf{d}, \mathsf{d}' \rangle \in D_a \times D_a : \mathsf{d} = [\![A]\!]^g \ \& \ \mathsf{d}' = [\![B]\!]^g \ \& \ \mathsf{d} = \mathsf{d}'\}|$

vii. $[\![u_a{}^{\top}\oplus B]\!]^g \doteq \langle (g(u_a) \oplus \top[\![B]\!]^g), \perp[\![B]\!]^g\rangle$

       $[\![u_a{}^{\perp}\oplus B]\!]^g \doteq \langle \top[\![B]\!]^g, (g(u_a) \oplus \perp[\![B]\!]^g)\rangle$

viii. $[\![\top a_n]\!]^g(\mathsf{i}) \doteq ((\top\mathsf{i})_a)_n$ if $\mathsf{i} \in D_s$

       $[\![\perp a_n]\!]^g(\mathsf{i}) \doteq ((\perp\mathsf{i})_a)_n$

ix. $[\![A\{B\}]\!]^g \doteq {}^{\chi}\{[\![A]\!]^g(\mathsf{j})| \ \mathsf{j} \in {}^{\{\}}[\![B]\!]^g\}$

x. $\mathsf{c}[\![A; B]\!]^g \doteq \mathsf{c}[\![A]\!]^g[\![B]\!]^g$

       $\mathsf{c}[\![A^{\top}; B]\!]^g \ \doteq \ \{\mathsf{l} \in \mathsf{c}[\![A; B]\!]^g| \ \exists a \forall \mathsf{k} \in \mathsf{c}[\![A; B]\!]^g \exists \mathsf{j} \in \mathsf{c}[\![A]\!]^g \exists \mathsf{i} \in \mathsf{c} \exists \mathsf{d} \in D_a:$
                  $\top \mathsf{k} \geq \top \mathsf{j} > \top \mathsf{i} \ \& \ (\top \mathsf{j})_1 = \mathsf{d} \ \& \ [\![B]\!]^g \neq [\![B[\top a_1/\perp a_1]]\!]^g \ \&$
                  $[\![\top a_1]\!](\mathsf{k}) = \mathsf{d}\}$

       $\mathsf{c}[\![A^{\perp}; B]\!]^g \ \doteq \ \{\mathsf{l} \in \mathsf{c}[\![A; B]\!]^g| \ \exists a \forall \mathsf{k} \in \mathsf{c}[\![A; B]\!]^g \exists \mathsf{j} \in \mathsf{c}[\![A]\!]^g \exists \mathsf{i} \in \mathsf{c} \exists \mathsf{d} \in D_a:$
                  $\perp \mathsf{k} \geq \perp \mathsf{j} > \perp \mathsf{i} \ \& \ (\perp \mathsf{j})_1 = \mathsf{d} \ \& \ [\![B]\!]^g \neq [\![B[\perp a_1/\top a_1]]\!]^g \ \&$
                  $[\![\perp a_1]\!](\mathsf{k}) = \mathsf{d}\}$

A *context* of utterance consists of a non-empty set of worlds (${}^{\{\}}\mathsf{p}_0$ for $\mathsf{p}_0 \in D_{\omega t}$) and an individual who is speaking throughout this modal domain (*common ground* and *speaker*, adapting Stalnaker 1975 and Kaplan 1978).

The common ground determines the *default state* of infotention ($^{st}p_0$, cf. 'commonplace effect' of Stalnaker 1978). The common ground itself is the default topical proposition, i.e. the $\top \Omega_1$-object throughout the default state $^{st}p_0$. Each common ground world (candidate for the speech world) is the local topic world, i.e. $\top \omega_1$-object on some $\top \bot$-list of the default state $^{st}p_0$.

DEFINITION 7_ω (contexts and defaults). For a model $M = \langle \{D_a | a \in \Theta\}, [\![\cdot]\!] \rangle$,

i.   an *M-context* is a pair $\langle p_0, [\![I]\!] \rangle \in D_{\omega t} \times D_\delta$ such that $^{\{\}}p_0 \neq \varnothing$ and
       $\forall w \in {}^{\{\}}p_0: [\![I]\!] \in {}^{\{\}}[\![spk]\!](w)$

ii. $^{st}p_0 = {}^{\chi}\{\langle \langle w, p_0 \rangle, \langle \rangle \rangle | w \in {}^{\{\}}p_0\}$ is the p_0-*default state* (of infotention)

The content of what is said updates the default state (cf. Stalnaker's 'essential effect'). For any input state of infotention c (set of $\top \bot$-lists), an update term K (of type $(st)st$) is assigned a truth value just in case it updates the primary topic to a proposition. In that case, the topical proposition is the set of worlds where K is true (*truth-set* of K); in any other world, K is false.

DEFINITION 8 (truth). Given an infotention state c, an $(st)st$ term K introduces the set of *primary topics* $\top_c K = \{(\top j)_1 | \forall g: j \notin {}^{\{\}}c \,\&\, j \in {}^{\{\}}(c[\![K]\!]^g)\}$.

i. K is *true* in c at world w iff $\exists p \in D_{\omega t}: \top_c K = \{p\} \,\&\, w \in {}^{\{\}}p$
ii. K is *false* in c at world w iff $\exists p \in D_{\omega t}: \top_c K = \{p\} \,\&\, w \notin {}^{\{\}}p$

In what follows UC_ω serves to represent nominal and modal reference in samples of Kalaallisut discourse. To factor in temporal reference we define an extension of this update system.

1.2 *General Update with Centering* (UC)

General *Update with Centering*, UC, extends UC_ω with three types of temporal discourse referents: events (ε), states (σ), and times (τ).

DEFINITION 2 (UC types). The set of UC types Θ is the smallest set such that (i) $t, \omega, \delta, \varepsilon, \sigma, \tau, s \in \Theta$, and (ii) $(ab) \in \Theta$ if $a, b \in \Theta$. The subset $\mathrm{DR}(\Theta) = \{\omega t, \omega, \delta, \varepsilon, \sigma, \tau\}$ is the set of discourse referent types within Θ.

UC-terms are interpreted on the same frames as UC_ω (D3 in §1.1), but in richer models (see D4 below). In natural language discourse time behaves like a chain of discrete instants (see Kamp 1979, Bittner 2008, a.o.). For simplicity, I model discourse time using integers (see D4.ii). A *discourse*

instant is a set of one integer (convex singleton set), whereas a *discourse period* is a set of successive integers (convex plural set). A discourse time t *precedes* t', written $t <_\tau t'$, iff every integer in t precedes every integer in t' (see D4.iii). Finally, UC has a set of time-related logical operators on discourse objects (see D4.iv.a–b). For any world w, the *run time* operator ϑ maps any eventuality in w to its time in w. If the eventuality is an event, then its run time in any world is a discourse instant, $\{n\}$, and its *consequent state* (CON) begins at the next instant, $\{(n + 1)\}$. If the eventuality is a state, then its run time in any world is a discourse period, and its *beginning* (BEG) and *end* (END) are events that begin and end that period. Some eventualities have a *central individual* (CTR) and possibly a contrasting *background individual* (BCK). In particular, verbal predicates ($A \in Con_{\omega a\delta...t}$, with $a \in \{\varepsilon, \sigma\}$) center their eventuality argument on their first individual argument. Eventuality-valued operators (CON, BEG, END) are center-preserving. The syntactic and semantic definitions of UC include three extra rules (xi–xiii), which introduce and interpret these time-related logical operators.

DEFINITION 4 (UC models) A UC model is a triple $M = \langle \{D_a|\ a \in \Theta\}, <_\tau, [\![\cdot]\!]\rangle$ where (i) $\{D_a|\ a \in \Theta\}$ is a UC frame, (ii) D_τ is the set of non-empty convex sets of integers, (iii) $t <_\tau t'$ iff $t, t' \in D_\tau$ & $\forall n \in t \forall n' \in t': n < n'$, and (iv) $[\![\cdot]\!]$ assigns to each non-logical constant $A \in Con_a$ a value $[\![A]\!] \in D_a$ and to each logical constant $B \in \{$CON, BEG, END, CTR, BCK, $\vartheta\}$ a value $[\![B]\!]$ such that:

a. $[\![\text{CON}]\!] \in D_{\varepsilon\sigma}$ $\qquad\qquad$ $[\![\vartheta]\!] \in \{f_\varepsilon \cup f_\sigma|\ f_\varepsilon \in D_{\omega\varepsilon\tau}$ & $f_\sigma \in D_{\omega\sigma\tau}\}$

$\quad$ $[\![\text{BEG}]\!], [\![\text{END}]\!] \in D_{\sigma\varepsilon}$ $\qquad$ $[\![\text{CTR}]\!], [\![\text{BCK}]\!] \in \{f_\varepsilon \cup f_\sigma|\ f_\varepsilon \in D_{\varepsilon\delta}$ & $f_\sigma \in D_{\sigma\delta}\}$

b. $\forall t \in D_\tau, w \in D_\omega, d \in D_\delta, e \in D_\varepsilon, s \in D_\sigma, ev \in D_\varepsilon \cup D_\sigma$:

$\quad$ $[\![\vartheta]\!](w, e) = t \rightarrow \exists n(t = \{n\}$ & $[\![\vartheta]\!](w, [\![\text{BEG}]\!]([\![\text{CON}]\!](e))) = \{(n + 1)\})$

$\quad$ $[\![\vartheta]\!](w, s) = t \rightarrow \{$MIN $t\} = [\![\vartheta]\!](w, [\![\text{BEG}]\!](s)) <_\tau \{$MAX $t\} = [\![\vartheta]\!](w, [\![\text{END}]\!](s))$

$\quad$ $d = [\![\text{BCK}]\!](ev) \rightarrow [\![\text{CTR}]\!](ev) \in D_\delta\backslash\{d\}$

$\quad$ $\langle ev, d, ...\rangle \in {}^{\{\}}[\![A]\!](w) \rightarrow d = [\![\text{CTR}]\!](ev)$ $\qquad$ if $A \in Con_{\omega a\delta...t}, a \in \{\varepsilon, \sigma\}$

$\quad$ $d = [\![\text{CTR}]\!](ev) \rightarrow d = [\![\text{CTR}]\!]([\![B]\!](ev))$ $\qquad\quad$ if $B \in \{$CON, BEG, END$\}$

DEFINITION 5 (UC syntax)

i–x.   As in DEFINITION 5_ω

xi. $(A \subset B), (A < B) \in Term_t$, if $A, B \in Term_\tau$

xii.   CON $A \in Term_\sigma$, if $A \in Term_\varepsilon$

$\quad$ BEG A, END $A \in Term_\varepsilon$, if $A \in Term_\sigma$

$\quad$ CTR A, BCK $A \in Term_\delta$, if $A \in Term_\varepsilon \cup Term_\sigma$

xiii. $\vartheta(W, A) \in Term_\tau$, if $W \in Term_\omega$ and $A \in Term_\varepsilon \cup Term_\sigma$

DEFINITION 6 (UC semantics).

i–x.   As in DEFINITION 6_ω

xi. $[\![A \subset B]\!]^g$ $=$ $|\{\langle t, t'\rangle \in D_\tau \times D_\tau: t = [\![A]\!]^g \,\&\, t' = [\![B]\!]^g \,\&\, t \subset t'\}|$

$[\![A < B]\!]^g$ $=$ $|\{\langle t, t'\rangle \in D_\tau \times D_\tau: t = [\![A]\!]^g \,\&\, t' = [\![B]\!]^g \,\&\, t <_\tau t'\}|$

xii. $[\![BA]\!]^g$ $\doteq$ $[\![B]\!]([\![A]\!]^g)$ if $B \in \{\text{CON, BEG, END, CTR, BCK}\}$

xiii. $[\![\vartheta(W, A)]\!]^g$ $\doteq$ $[\![B]\!]([\![W]\!]^g, [\![A]\!]^g)$

A UC-*context* pairs a common ground, $^{\{\}}p_0$, with a $^{\{\}}p_0$-speech event, e_0 (see D7). The default state of infotention depends on both: the common ground sets the default modal topics, whereas the speech event sets the default temporal topics. The modal defaults are the same as in UC_ω. In the temporal domain, the speech instant serves as the default topic time, and the speech event itself, as the default perspective point (e.g. for indexicals, cf. Kaplan 1978). The truth definition for UC is the same as for UC_ω (i.e. D8).

DEFINITION 7 (contexts, defaults). For a model $M = \langle \{D_a|\, a \in \Theta\}, <_\tau, [\![\cdot]\!]\rangle$,

i.   an *M-context* is a pair $\langle p_0, e_0\rangle \in D_{\omega t} \times D_\varepsilon$ such that (i) $^{\{\}}p_0 \neq \varnothing$, and
(ii) $\exists t_0 \forall w \in {}^{\{\}}p_0: t_0 = [\![\vartheta]\!](w, e_0) \,\&\, \langle e_0, [\![\text{CTR}]\!](e_0)\rangle \in {}^{\{\}}[\![spk]\!](w)$

ii. $^{st}\langle p_0, e_0\rangle = {}^\chi\{\langle\langle t_0, w, p_0, e_0\rangle, \langle\,\rangle\rangle|\, w \in {}^{\{\}}p_0 \,\&\, t_0 = [\![\vartheta]\!](w, e_0)\}$

In what follows, we systematically first use UC_ω to analyze modal reference and then the full UC, to factor in temporal reference. We begin with fact-oriented moods (§2) and successively add attitudinal predicates (§3), hypothetical mood (§4), remoteness (§5), and direct composition (§6).

2 FACT-ORIENTED MOODS

2.1. *Observations*

Kalaallisut verbs inflect for *matrix mood* (7) or *dependent mood* (8). Matrix moods are illocutionary. A matrix 'verb' is a complete sentence, classified as an assertion about the topic (declarative, DEC), question about the topic (interrogative, QUE), wish concerning the topic (optative, OPT), or directive to the addressee (imperative, IMP). Dependent moods classify the dependent verb in relation to the matrix, e.g. as a *background fact* (FCT), *hypothesis* (HYP), or *elaboration* (ELA). They also mark the centering status of the dependent subject as either *topical* (e.g. -FCT$_\top$) or *backgrounded* (e.g. -FCT$_\perp$), i.e., anaphoric or in contrast to the matrix subject, which is always topical.

(7) Matrix moods

    a. *Utir-pu-q.*
       return-DEC$_{iv}$-3S$_{(T)}$
       He$_T$ has returned.

    b. *Utir-pa?*
       return-QUE.3S$_{(T)}$
       Has he$_T$ returned?

    c. (*Aqagu*)   *utir-li*!
       (tomorrow) return-OPT.3S$_{(T)}$
       May he$_T$ return (tomorrow)!

    d. (*Aqagu*)   *utir-gina*!
       (tomorrow) return-IMP.2S
       Return (tomorrow)!

(8) Dependent moods (sample)

    a. *Nuannaar-pu-q*   *utir-{-ga-mi | -mm-at}*
       happy-DEC$_{iv}$-3S return-{-FCT$_T$-3S$_T$ | -FCT$_\perp$-3S$_\perp$}

       He$_T$ is happy because {he$_T$ | he$_\perp$} has returned.

    b. *Utir-{-gu-ni | -pp-at}*   *nuannaar-ssa-pu-q*
       return-{-HYP$_T$-3S$_T$| -HYP$_\perp$-3S$_\perp$} happy-exp$^{>}$-DEC$_{iv}$-3S

       If (or when) {he$_T$ | he$_\perp$} returns he$_T$'ll be happy.

    c. *Uqar-pu-q*   {*utir-nirar-llu-ni | utir-tu-q*}
       say-DEC$_{iv}$-3S$_{(T)}$ {return-say$_{se}$-ELA$_T$-3S$_T$ | return-ELA$_{\perp iv}$-3S$_\perp$}

       He$_T$ has said {he$_T$ | he$_\perp$} has returned.

Both mood paradigms oppose *fact-oriented* moods (DEC, QUE, FCT) to *prospect-oriented* moods (OPT, IMP, HYP). The former introduce *currently verifiable facts* (see below), the latter, *current prospects*, i.e. eventualities that may become currently verifiable facts from a future perspective point.

DEFINITION (currently verifiable fact). From the perspective of an event e, an event e' (or state s) is a *currently verifiable fact* iff e' (or the beginning of s) has already happened in the same world as e.

OBSERVATION 1. *Fact-oriented mood* asserts that the last eventuality of the verb is a currently verifiable fact from the perspective of the speech act.

Fact-orientation has implications for temporal anaphora. By default, a currently verifiable state holds now (9a) whereas a currently verifiable event has a consequent state that holds now (9b) (Bittner 2005, 2008). These defaults can be defeated by explicitly introducing another topic time, subject to current verifiability (see (10)–(11)). Since the future cannot be verified now, fact-oriented moods are incompatible with future location times (e.g. *'tomorrow').

(9)   a. *Ulapik-pu-nga.*
          busy-DEC$_{iv}$-1S
          I am busy.
      b. *Utir-pu-nga.*
          return-DEC$_{iv}$-1S
          I have returned.

(10) a. {*Ullumi | *aqagu*}   *ulapik-pu-nga.*
          {today | *tomorrow} busy-DEC$_{iv}$-1S
          I've been busy {today | *tomorrow}.
      b. {*Ullumi| *aqagu*}   *utir-pu-nga.*
          {today | *tomorrow} return-DEC$_{iv}$-1S
          I returned {today | *tomorrow}.

(11) a. *Ole aliasuk-pu-q*   {*ullumi | *aqagu*}   *ulapik-ga-ma.*
          Ole sad-DEC$_{iv}$-3S$_{(T)}$ {today | *tomorrow} busy-FCT$_T$-1S
          Ole is sad because I've been busy {today | *tomorrow}.
      b. *Ole aliasuk-pu-q   Aani* {*ullumi | *aqagu*}   *utir-mm-at.*
          Ole sad-DEC$_{iv}$-3S$_{(T)}$ Ann {today | *tomorrow} return-FCT$_\perp$-3S$_\perp$
          Ole is sad because Ann returned {today | *tomorrow}.

In this respect, fact-oriented moods are unlike the English indicative non-past, which can refer to the future, e.g. in *I {return | am busy} tomorrow.* They are also unlike the English indicative past, which can refer to what is possible rather than what is, e.g. in *If Oswald didn't kill Kennedy, then someone else did*. In contrast, the literal Kalaallisut translation (12) is ungrammatical. The eventuality (-prf) marked as a currently verifiable fact by the declarative mood is in conflict with the hypothesized prospect. To resolve this conflict the declarative mood inflection must mark a currently verifiable attitudinal state directed toward a prospect (e.g. *-ssa* 'exp$^>$' in (2), see also §4 below).

(12) * *Oswald-p   Kennedy   tuqut-sima-nngit-pp-a-gu*
        Oswald-ERG   Kennedy   kill-prf-not-HYP$_\perp$-3S$_\perp$-3S
        inuk-piluk-qat-ata   tuqut-sima-pa-a.
        man-bad-other-3S$_\perp$.ERG   kill-prf-DEC$_{tv}$-3S$_{(T)}$.3S$_{(\perp)}$
        (Intended: If Oswald didn't kill Kennedy, then someone else did.)

Fact-orientation is compatible with negation. Negation in Kalaallisut involves the derivational suffix *-nngit* 'not' (which allows further derivation, e.g. (13iii)). Temporal anaphora and modification show that the negation

suffix introduces a state (like the root *sinik-* 'asleep' in (13i, ii, iii)). Negative states can be currently verifiable facts, as shown by the compatibility of the negation suffix *-nngit* with fact-oriented moods (i) and their elaborations (ii).

(13) i. *Ullumi sivisuuq-mik {makik-nngit-la- | sinik-pu |*makik-pu-}-nga.*
        today long-MOD {get.up-*not*-DEC-|asleep-DEC$_{iv}$|*get.up-DEC$_{iv}$}-1S
        Today I {stayed in bed | slept | *got up} a long time.
    ii. *Suli {makik-nngit- | sinik-}-tu-nga*   *Ole isir-pu-q.*
        still {get.up-*not*- | asleep-}-ELA$_{\perp}$.iv-1S Ole enter-DEC$_{iv}$-3S$_{(\top)}$
        While I was still {in bed | asleep} Ole dropped in.
    iii. *Nulia-ni   aamma suli {makik-nngit- | sinik-}-nirar-pa-a.*
        wife-3S$_{\top}$ also   still {get.up-*not*-| asleep-}-say$_{\perp}$-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$
        He said that his wife too was still {in bed | asleep}.

I propose that the current verifiability assertion of fact-oriented moods has two components: modal and temporal. Modally, the matrix declarative mood (DEC) locates the matrix event throughout the output common ground (main fact), whereas the dependent factual mood (FCT) locates the subordinate event throughout a superset of the common ground (background fact). Thus, both events are realized in every live candidate for the speech world, so they can be verified in that world. Temporally, the matrix declarative mood locates the matrix event before the speech act. That is, from the perspective of the speech act the matrix event is a *currently* verifiable fact. The dependent factual mood locates the matrix event within the consequent state of the subordinate event. Thus, the subordinate event is verifiable from the matrix event, whose temporal location within the consequent state further suggests a causal link. It does not entail it because *post hoc* is not necessarily *propter hoc*. But whether or not the (real) subordinate event caused the (real) matrix event, neither event can be located in the future of the speech act.

To make this proposal precise, we first formalize the modal notion of a *verifiable fact* (§2.2) and then, the temporal restrictor *currently* (§2.3).

2.2 *Verifiable facts*

Discourse (14i, ii) illustrates typical use of fact-oriented moods (DEC, FCT) and their interaction with negation. In UC$_{\omega}$, I propose to represent this discourse as (15i, ii), using the drt-notation defined in Table 1.

(14) i. *Ole isir-pu-q.*
       Ole enter-DEC$_{iv}$-3S$_{(T)}$
       Ole^T has dropped in.

   ii. *Nuannaar-nngit-la-q   nulia-ni   naparsima-mm-at.*
       happy-not-DEC-3S$_{(T)}$ wife-3S$_T$ ill-FCT$_\perp$-3S$_\perp$
       He$_T$'s not happy because his$_T$ wife is ill.

Table 1. drt-abbreviations for UC$_{(\omega)}$-terms
• static relations ($a \in$ DR(Θ))

$A_a \in B_{at}$	for	BA
$A_a \notin B_{at}$	for	$\neg BA$
$A_{at} \subseteq B_{at}$	for	$\forall u_a(u \in A \rightarrow u \in B)$

• local drt-projections, conditions, and updates ($a \in$ DR(Θ))

$\top a, \perp a$	for	$\top a_1, \perp a_1$
$A_a{}^\circ$	for	$\lambda i_s. A$
$A_{sa}{}^\circ$	for	$\lambda i_s. Ai$
$B_W \langle A_1, \dots A_n \rangle$	for	$\lambda i_s. B(W^\circ i, A_1{}^\circ i, \dots A_n{}^\circ i)$
$B =_i A$	for	$\lambda i_s. B^\circ i = A^\circ i$
(C_1, C_2)	for	$\lambda i_s. C_1 i \wedge C_2 i$
$[C]$	for	$\lambda I_{st} \lambda j_s. Ij \wedge Cj$
$^\top[u_a]$	for	$\lambda I_{st} \lambda j_s. \exists u_a \exists i_s(j = (u {}^\top\oplus i) \wedge Ii)$
$[u_a]$	for	$\lambda I_{st} \lambda j_s. \exists u_a \exists i_s(j = (u {}^\perp\oplus i) \wedge Ii)$
$^\top[u_1 \dots u_n| C]$	for	$\lambda I_{st} \lambda j_s. \exists u_1 \dots u_n \exists i_s(j = (u_1 {}^\top\oplus \dots (u_n {}^\top\oplus i)) \wedge Ii \wedge Ci)$
$[u_1 \dots u_n| C]$	for	$\lambda I_{st} \lambda j_s. \exists u_1 \dots u_n \exists i_s(j = (u_1 {}^\perp\oplus \dots (u_n {}^\perp\oplus i)) \wedge Ii \wedge Ci)$

• global drt-updates ($a \in$ DR(Θ), $\mathbf{R} \in \{=, \in, \notin, \subseteq\}$)

$[A \mathbf{R} B\|]$	for	$\lambda I_{st} \lambda j_s. Ij \wedge Aj \mathbf{R} B\{I\})$
$[A\| \mathbf{R} B\|]$	for	$\lambda I_{st} \lambda j_s. Ij \wedge A\{I\} \mathbf{R} B\{I\})$
$^\top[u_a| u \mathbf{R} A\|]$	for	$\lambda I_{st} \lambda j_s. \exists u_a \exists i_s(j = (u {}^\top\oplus i) \wedge Ii \wedge u \mathbf{R} A\{I\})$
$[u_a| u \mathbf{R} A\|]$	for	$\lambda I_{st} \lambda j_s. \exists u_a \exists i_s(j = (u {}^\perp\oplus i) \wedge Ii \wedge u \mathbf{R} A\{I\})$
$^P K_{(st)st}$	for	$\lambda I_{st} \lambda j_s. KIj \wedge \forall v_\omega(v \in \top \omega_1\{I\} \rightarrow v \in \top \omega_1\{KI\})$

(15) i. $^\top[x| x =_i ole] {}^\top;$ ($^P[spk_{\top\omega}\langle I \rangle]; [enter_{\top\omega}\langle \top \delta \rangle]; {}^\top[p| p = \top \omega\|])$

   ii. $^P[spk_{\top\omega}\langle I \rangle]; [v| happy_v\langle \top \delta \rangle]; [\top \omega \notin \perp \omega\|]; {}^\top[p| p = \top \omega\|];$
       $([v] {}^\perp; [y| wife_{\perp\omega}\langle y, \top \delta \rangle, ill_{\perp\omega}\langle y \rangle]); [\top \omega\| \subseteq \perp \omega\|]$

The declarative sentence (14i) translates into (15i). This topic-comment sequence ($^\top;$) reduces to a plain sequence (;), because the topic-

setting update (16) adds Ole to the $\top$-list, and this topic is referred to (by $\top\delta$:= $\top\delta_1$) and maintains its ($\top\delta$-)rank in the comment (17)–(19). The three boxes in the comment successively test and update the output (c_1) of the topic-update (16). First, the illocutionary presupposition (17) of the declarative mood tests that every world in the input common ground (set of topic worlds) is a speech world. The input state (c_1) passes this test because the default state ($^{st}p_0$) does (by $D7_\omega$). Next, (18) adds new information that the topical individual entered in the topical speech world. This eliminates from the common ground those worlds where this is not the case. Finally, in (19) the declarative mood introduces the set of surviving topic worlds (i.e. the p_0-worlds where Ole entered) as the primary topic. This is the new topical proposition and the truth-set of the declarative sentence (14i).

(16) $(^{st}p_0)[\![^\top[x_\delta|\ x =_i ole]]\!]^g$ =: c_1

    := $[\![^P(\lambda I_{st}\lambda j_s.\ \exists x_\delta \exists i_s(j = (x\ ^\top\oplus i) \wedge Ii \wedge x = ole)]\!]^g(^{st}p_0)$

    = $^x\{\langle\langle a, w, p_0\rangle, \langle\ \rangle\rangle|\ w \in {}^{\{\}}p_0\ \&\ a = [\![ole]\!]\}$

(17) $c_1[\![^P[spk_{\top\omega}\langle I\rangle]]\!]^g$

    := $[\![\lambda I_{st}\lambda j_s.\ Ij \wedge spk(\top\omega_1 j, I)$

        $\wedge\ \forall v_\omega(v \in \top\omega_1\{I\} \rightarrow v \in \top\omega_1\{\lambda i_s(Ii \wedge spk(\top\omega_1 i, I))\})]\!]^g(c_1)$

    = $^x\{\langle\langle a, w, p_0\rangle, \langle\ \rangle\rangle \in c_0|\ \forall v \in {}^{\{\}}p_0\colon [\![I]\!] \in {}^{\{\}}[\![spk]\!](v)\}$ = c_1

(18) $c_1[\![[enter_{\top\omega}\langle\top\delta\rangle]]\!]^g$ =: c_2

    := $[\![\lambda I_{st}\lambda j_s.\ Ij \wedge enter(\top\omega_1 j, \top\delta_1 j)]\!]^g(c_1)$

    = $^x\{\langle\langle a, w, p_0\rangle, \langle\ \rangle\rangle \in c_1|\ a \in {}^{\{\}}[\![enter]\!](w)\}$

    = $^x\{\langle\langle a, w, p_0\rangle, \langle\ \rangle\rangle|\ w \in {}^{\{\}}p_0\ \&\ a = [\![ole]\!]\ \&\ a \in {}^{\{\}}[\![enter]\!](w)\}$

(19) $c_2[\![^\top[p_\Omega|\ p = \top\omega|]]\!]^g$ =: c_3

    := $[\![\lambda I_{st}\lambda j_s.\ \exists p_\Omega \exists i_s(j = (p\ ^\top\oplus i) \wedge Ii \wedge p = \top\omega_1\{I\})]\!]^g(c_2)$

    = $^x\{\langle\langle p_1, a, w, p_0\rangle, \langle\ \rangle\rangle|\ w \in {}^{\{\}}p_0\ \&\ a = [\![ole]\!]\ \&\ a \in {}^{\{\}}[\![enter]\!](w)$

        $\&\ {}^{\{\}}p_1 = \{w' \in {}^{\{\}}p_0|\ a \in {}^{\{\}}[\![enter]\!](w')\}\}$

In (14ii) the negated declarative matrix ('happy-not-DEC-3S$_{(\top)}$') is represented by the first four boxes of (15ii). The first box is the illocutionary presupposition test of the declarative mood. The current input state (c_3) passes this test (like c_1 in (17)). Next, the scope of negation introduces the set of worlds where the topical individual (Ole) is happy (20). The negation asserts that the world of evaluation is not in this set (21). The fact-oriented

declarative mood identifies the world of evaluation as the topical speech world ($\top\omega$), and introduces the set of surviving topic worlds (i.e. the p_1-worlds where Ole is not happy) as the new primary topic (22). This is the truth-set of the negated declarative matrix of (14ii) in the context of (14i).

(20) $c_3[\![[v_\omega|\ happy_v\langle\top\delta\rangle]]\!]^g$ $\qquad\qquad\qquad\qquad\qquad$ =: c_4

$:=\ [\![\lambda I_{st}\lambda j_s.\ \exists v_\omega\exists i_s(j = (v\ {}^\perp\!\oplus\ i) \wedge Ii \wedge happy(v, \top\delta_1 i))]\!]^g(c_3)$

$=\ {}^\chi\{\langle\langle p_1, a, w, p_0\rangle, \langle v\rangle\rangle|\ \langle\langle p_1, a, w, p_0\rangle, \langle\ \rangle\rangle \in c_3\ \&\ a \in {}^{\{\}}[\![happy]\!](v)\}$

(21) $c_4[\![[\top\omega\notin\perp\omega|]]\!]^g$ $\qquad\qquad\qquad\qquad\qquad\qquad$ =: c_5

$:=\ [\![\lambda I_{st}\lambda j_s.\ Ij \wedge \top\omega_1 j \notin \perp\omega_1\{I\}]\!]^g(c_4)$

$=\ {}^\chi\{\langle\langle p_1, a, w, p_0\rangle, \langle v\rangle\rangle \in c_4|\ w \notin \{v'|\ a \in {}^{\{\}}[\![happy]\!](v')\}\}$

$=\ {}^\chi\{\langle\langle p_1, a, w, p_0\rangle, \langle v\rangle\rangle|\ \langle\langle p_1, a, w, p_0\rangle, \langle\ \rangle\rangle \in c_3\ \&\ a \in {}^{\{\}}[\![happy]\!](v)$

$\&\ a \notin {}^{\{\}}[\![happy]\!](w)\}$

(22) $c_5[\![{}^\top[p_\Omega|\ p = \top\omega|]]\!]^g$ $\qquad\qquad\qquad\qquad\qquad$ =: c_6

$:=\ [\![\lambda I_{st}\lambda j_s.\ \exists p_\Omega\exists i_s(j = (p\ {}^\top\!\oplus\ i) \wedge Ii \wedge p = \top\omega_1\{I\})]\!]^g(c_5)$

$=\ {}^\chi\{\langle\langle p_2, p_1, a, w, p_0\rangle, \langle v\rangle\rangle|\ \langle\langle p_1, a, w, p_0\rangle, \langle\ \rangle\rangle \in c_3\ \&\ a \in {}^{\{\}}[\![happy]\!](v)$

$\&\ a \notin {}^{\{\}}[\![happy]\!](w)\ \&\ {}^{\{\}}p_2 = \{w' \in {}^{\{\}}p_1|\ a \notin {}^{\{\}}[\![happy]\!](w')\}\}$

The declarative matrix of (14ii) is followed by a dependent factual (FCT) clause, which introduces a background fact that may have caused the matrix fact. In (15ii) this factual clause contributes a background-elaboration sequence ($\perp$;). This reduces to a plain sequence because the background-setting update (23) adds a world to the $\perp$-list, and this world is referred to (by $\perp\omega := \perp\omega_1$) and maintains its ($\perp\omega$-)rank in the elaboration (24). The entire sequence introduces into the background the proposition that Ole has a sick wife (set of $\perp\omega$-worlds, u, in (24)).

(23) $c_6[\![[v_\omega]]\!]^g$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ =: c_7

$:=\ [\![\lambda I_{st}\lambda j_s.\ \exists v_\omega\exists i_s(j = (v\ {}^\perp\!\oplus\ i) \wedge Ii)]\!]^g(c_6)$

$=\ {}^\chi\{\langle\langle p_2, p_1, a, w, p_0\rangle, \langle u, v\rangle\rangle|\ \langle\langle p_2, p_1, a, w, p_0\rangle, \langle v\rangle\rangle \in c_6\ \&\ u \in D_\omega\}$

(24) $c_7[\![[y_\delta|\ wife_{\perp\omega}\langle y, \top\delta\rangle, ill_{\perp\omega}\langle y\rangle]]\!]^g$ $\qquad\qquad\qquad$ =: c_8

$:=\ [\![\lambda I_{st}\lambda j_s.\exists y_\delta\exists i_s(j = (y\ {}^\perp\!\oplus\ i) \wedge Ii \wedge wife_{\perp\omega_i}(y, \top\delta_1 i) \wedge ill_{\perp\omega_i}(y))]\!]^g(c_7)$

$=\ {}^\chi\{\langle\langle p_2, p_1, a, w, p_0\rangle, \langle b, u, v\rangle\rangle|\ \langle\langle p_2, p_1, a, w, p_0\rangle, \langle u, v\rangle\rangle \in c_6$

$$\&\; u \in D_\omega \;\&\; \langle b, a \rangle \in {}^{\{\}}[\![wife]\!](u) \;\&\; b \in {}^{\{\}}[\![ill]\!](u)\}$$

The factual mood adds that this background proposition is a fact (i.e. true) throughout the matrix common ground (25). This suggests that it may be a cause of the matrix fact (i.e. of the proposition that Ole has entered unhappy in the same world as the current speech act).

(25) $c_8[\![[\top\omega]\!] \subseteq \perp\omega[\!]]\!]^g$ =: c_9

     := $[\![\lambda I_{st}\lambda j_s.\; Ij \wedge \top\omega\{I\} \subseteq \perp\omega\{I\}]\!]^g(c_8)$

     = ${}^x\{\langle\langle p_2, p_1, a, w, p_0 \rangle, \langle b, u, v \rangle\rangle |\; \{\langle\langle p_2, p_1, a, w, p_0 \rangle, \langle v \rangle\rangle \in c_6$

         $\&\; u \in D_\omega \;\&\; \langle b, a \rangle \in [\![wife]\!](u) \;\&\; b \in {}^{\{\}}[\![ill]\!](u)$

         $\&\; {}^{\{\}}p_2 \subseteq \{u' |\; \exists b': \langle b', a \rangle \in {}^{\{\}}[\![wife]\!](u') \;\&\; b' \in {}^{\{\}}[\![ill]\!](u')\}\}$

This suggestion is reinforced by temporal anaphora, which locates the beginning of Ole's unhappy state within the consequent state of the beginning of his wife's illness. This temporal relation is derived in §2.3, which explicates the notion of *current* verifiability.

2.3 *Current verifiability*

In what follows, e, e' are variables of type ε (events), s, s' of type σ (states), and t, t' of type τ (times). Time-related drt-notation is defined in Table 2.

Table 2 drt-abbreviations for time-related UC-terms
• static relations and operations

$t \subseteq t'$	for	$t \subset t' \vee t = t'$
$t \leq t'$	for	$t < t' \vee t = t'$
$\mathrm{AT}_w(e, t)$	for	$(\vartheta_w e \subset t)$
$\mathrm{AT}_w(s, t)$	for	$(t \subset \vartheta_w s)$
EVT e, EVT s	for	e, BEG s
STA s, STA e	for	s, CON e

• related drt-abbreviations ($a \in \mathrm{DR}(\Theta)$, $\mathbf{R} \in \{=, \subseteq, \subset, \leq, <\}$)

$B_{ab}\, A_{sa}$	for	$\lambda i_s.\; B\, Ai$
$(A\; \mathbf{R}_W\, B)$	for	$\lambda i_s.\; \vartheta_{W^\circ i}\, A^\circ i\; \mathbf{R}\; \vartheta_{W^\circ i}\, B^\circ i$
$[\mathrm{AT}_W\{A, T\}]$	for	$\lambda I_{st}\lambda j_s.\; Ij \wedge \exists i_s(Ii \wedge \vartheta_{Wj}\, \text{EVT } Ai \subset Ti) \rightarrow \vartheta_{Wj}\, \text{EVT } Aj \subset Tj)$
		$\wedge \neg\exists i_s(Ii \wedge \vartheta_{Wj}\, \text{EVT } Ai \subset Ti) \rightarrow Tj \subset \vartheta_{Wj}\, \text{STA } Aj)$

The global AT-update, $[\mathrm{AT}_W\{A, T\}]$, provides a unified analysis of two temporal patterns found in Kalaallisut: *default* (9) (= (26)) and *default-*

override (10) (= (27)). By default, a currently verifiable state holds now (26a), whereas a currently verifiable event has a consequent state that holds now (26b). Other topic times can be set, subject to current verifiability (27).

(26) a. *Ulapik-pu-nga.*
       busy-DEC$_{iv}$-1S
       I am busy.
    b. *Utir-pu-nga.*
       return-DEC$_{iv}$-1S
       I have returned.

(27) a. {*Ullumi* | **aqagu*}   *ulapik-pu-nga.*
       {today | *tomorrow}   busy-DEC$_{iv}$-1S
       I've been busy {today | *tomorrow}.
    b. {*Ullumi* | **aqagu*}   *utir-pu-nga.*
       {today | *tomorrow}   return-DEC$_{iv}$-1S
       I returned {today | *tomorrow}.

In UC the default pattern (26a, b) translates into (28a, b). These UC representations are interpreted relative to the default state of infotention where the topic time ($\top \tau$) is the speech instant. Since an instant (unit set) cannot properly include anything, the global AT-updates in (28a, b) reduce to (29a, b). That is, what holds at the topical instant is the STA-state of the verbal base (the state itself in (29a), consequent state in (29b)). Fact-oriented declarative mood further asserts verifiability from the speech act. That is, the EVT-event (beginning of the state in (29a), event itself in (29b)) must have already happened in the speech world ($\top \omega$) by this perspective point ($\top \varepsilon$).

(28) a. $^{P}[spk_{\top\omega}\langle \top \varepsilon, \text{CTR } \top \varepsilon \rangle]$; $([s| \ busy_{\top\omega}\langle s, \text{CTR } \top \varepsilon \rangle] \ ^{\perp}; [\text{AT}_{\top\omega}\{\perp\sigma, \top\tau\}])$;
       $[\text{EVT } \perp\sigma <_{\top\omega} \top \varepsilon]$; $^{\top}[p| \ p = \top\omega\|]$
    b. $^{P}[spk_{\top\omega}\langle \top \varepsilon, \text{CTR } \top \varepsilon \rangle]$; $([e| \ return_{\top\omega}\langle e, \text{CTR } \top \varepsilon \rangle] \ ^{\perp}; [\text{AT}_{\top\omega}\{\perp\varepsilon, \top\tau\}])$
       ; $[\text{EVT } \perp\varepsilon <_{\top\omega} \top \varepsilon]$; $^{\top}[p| \ p = \top\omega\|]$

(29) a. $^{P}[spk_{\top\omega}\langle \top \varepsilon, \text{CTR } \top \varepsilon \rangle]$; $[s| \ busy_{\top\omega}\langle s, \text{CTR } \top \varepsilon \rangle, \top\tau \subset_{i} \vartheta_{\top\omega} \ s,$
       $\text{BEG } s <_{\top\omega} \top \varepsilon]$; $^{\top}[p| \ p = \top\omega\|]$
    b. $^{P}[spk_{\top\omega}\langle \top \varepsilon, \text{CTR } \top \varepsilon \rangle]$; $[e| \ return_{\top\omega}\langle e, \text{CTR } \top \varepsilon \rangle, \top\tau \subset_{i} \vartheta_{\top\omega} \ \text{CON } e,$
       $e <_{\top\omega} \top \varepsilon]$; $^{\top}[p| \ p = \top\omega\|]$

Unmarked temporal nouns are topic-setting sentence (s) modifiers or elaborating verbal base ($\underline{s} := s\backslash pn_\omega$) modifiers. (Type $[] := (st)st$, $[a] := a[]$.)

today-$^\mathrm{T}$ $\vdash$ s/s: $\lambda K_{[]}(^\mathrm{T}[t|\ t \subseteq_i tod_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon]\ ^\mathrm{T}; K)$

today-$_a$ $\vdash$ $\underline{s}/\underline{s}$: $\lambda \underline{V}_{[s\omega]}\lambda \underline{w}_{s\omega}(\underline{V}\ \underline{w}\ ^\perp; [\vartheta_{\underline{w}}\ \perp a \subseteq_i tod_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon])$ $\qquad\qquad a \in \{\varepsilon, \sigma\}$

On the default-override reading of (27a, b), 'today-$^\mathrm{T}$' updates the topic time ($\mathsf{T}\tau$) to part of the speech day (30a, b). Since this can properly include an event, the global AT-update includes within this topical period the EVT-event, i.e. the beginning of the state in (30a) and the event itself in (30b). Both events must be currently verifiable, i.e. must have already happened in the speech world ($\mathsf{T}\omega$) before the speech act ($\mathsf{T}\varepsilon$). This rules out future topic times. On the elaborating reading, 'today-$_a$' elaborates the verbal base (as in (31a, b)). The topic time remains the speech instant, so the result is a temporally elaborated variant of the default pattern (29a, b). For non-future location times this result is coherent (e.g. (31a, b)). Future location times are still ruled out because future eventualities fail the current verifiability test.

(30)   a. $^\mathrm{T}[t|\ t \subseteq_i tod_{\mathsf{T}\omega}\ \mathsf{T}\ \varepsilon]\ ^\mathrm{T}; (^\mathrm{P}[spk_{\mathsf{T}\omega}\langle\mathsf{T}\ \varepsilon, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle]; [s|\ busy_{\mathsf{T}\omega}\langle s, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle,$
$\vartheta_{\mathsf{T}\omega}\ \mathrm{BEG}\ s \subset_i \mathsf{T}\tau,\ \mathrm{BEG}\ s <_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon];\ ^\mathrm{T}[p|\ p = \mathsf{T}\ \omega||])$

b. $^\mathrm{T}[t|\ t \subseteq_i tod_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon]\ ^\mathrm{T}; (^\mathrm{P}[spk_{\mathsf{T}\omega}\langle\mathsf{T}\ \varepsilon, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle]; [e|\ return_{\mathsf{T}\omega}\langle e, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle,$
$\vartheta_{\mathsf{T}\omega}\ e \subset_i\mathsf{T}\tau,\ e <_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon];\ ^\mathrm{T}[p|\ p = \mathsf{T}\ \omega||])$

(31)   a. $^\mathrm{P}[spk_{\mathsf{T}\omega}\langle\mathsf{T}\ \varepsilon, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle]; [s|\ busy_{\mathsf{T}\omega}\langle s, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle, \vartheta_{\mathsf{T}\omega}\ s \subseteq tod_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon,$
$\mathsf{T}\tau \subset_i \vartheta_{\mathsf{T}\omega}\ s,\ \mathrm{BEG}\ s <_{\mathsf{T}\omega}\ \mathsf{T}\ \varepsilon];\ ^\mathrm{T}[p|\ p = \mathsf{T}\ \omega||]$

b. $^\mathrm{P}[spk_{\mathsf{T}\omega}\langle\mathsf{T}\ \varepsilon, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle]; [e|\ return_{\mathsf{T}\omega}\langle e, \mathrm{CTR}\ \mathsf{T}\ \varepsilon\rangle, \vartheta_{\mathsf{T}\omega}\ e \subseteq tod_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon,$
$\mathsf{T}\tau \subset_i \vartheta_{\mathsf{T}\omega}\ \mathrm{CON}\ e,\ e <_{\mathsf{T}\omega}\mathsf{T}\ \varepsilon];\ ^\mathrm{T}[p|\ p = \mathsf{T}\ \omega||]$

For discourse (14i, ii), temporal reference is explicated in (32i, ii):

(32i) (14i) Ole-$^{\top}$ has dropped in.

Ole-$^{\top}$ *enter*-DEC$_{iv}$-3S$_{(\top)}$

$^{\top}[x|\, x =_i ole]\, ^{\top}; (^{\text{P}}[spk_{\top\omega}\langle\top\varepsilon, \text{CTR } \top\varepsilon\rangle]); [e|\, enter_{\top\omega}\langle e, \top\delta\rangle,$
$\top\tau \subset_i \vartheta_{\top\omega} \text{ CON } e, e <_{\top\omega} \top\varepsilon]; ^{\top}[p|\, p = \top\omega\|])$

(32ii) (14ii) He$_{\top}$'s not happy because his$_{\top}$ wife is ill.

happy-*not*-DEC-3S$_{(\top)}$ *wife*-3S$_{\top.}$$^{\perp}$ *ill*-FCT$_{\perp}$-3S$_{\perp}$

$^{\text{P}}[spk_{\top\omega}\langle\top\varepsilon, \text{CTR } \top\varepsilon\rangle]; [s\, v|\, happy_v\langle s, \top\delta\rangle, \top\tau \subset_i \vartheta_v s]; [\top\omega \notin \perp\omega\|]$
$; [s|\, \text{CTR } s =_i \top\delta, \top\tau \subset_i \vartheta_{\top\omega} s, \text{BEG } s <_{\top\omega} \top\varepsilon]; ^{\top}[p|\, p = \top\omega\|];$
$([t|\, t =_i \vartheta_{\top\omega} \text{ BEG } \perp\sigma]; [v]; [y|\, wife_{\perp\omega}\langle y, \top\delta, \top\tau\rangle]; [s|\, ill_{\perp\omega}\langle s, \perp\delta\rangle,$
$\perp\tau \subset_i \vartheta_{\perp\omega} \text{ CON BEG } s]; [\top\omega\| \subseteq \perp\omega\|])$

The declarative matrix verbs in (32i, ii) instantiate the default pattern (26) for events ('*enter-*') and states ('*-not*'). In (32ii) the factual mood on the dependent verb locates the matrix event (beginning of Ole's unhappy state) within the consequent state of the subordinate event (beginning of his wife's illness) throughout the matrix common ground ($\top\omega\|$). This suggests, but does not entail, that the subordinate fact may have caused the matrix fact.

To summarize the argument so far: fact-oriented moods assert that the verbal event (EVT) is a speech act verifiable fact. Modally, the declarative matrix mood (DEC) locates the matrix event throughout the output common ground (main fact), whereas the factual mood (FCT) locates the subordinate event throughout a superset of this modality (background fact). Both events are thus realized in (every live candidate for) the speech world and are therefore verifiable in that world. Temporally, the declarative mood locates the matrix event before the speech act. Thus, from the perspective of the speech act the matrix event is a *currently* verifiable fact. The factual mood locates the matrix event within the consequent state of the subordinate event. The subordinate event is thus verifiable from the matrix event and hence *a fortiori* from the speech act. The location within the consequent state further suggests that the (verifiable) matrix event may have been caused by the (verifiable) subordinate event. Whether or not there is such a causal link, neither event can be located in the future of the speech act.

We now turn to a special case of fact-oriented discourse—to wit, discourses that introduce currently verifiable attitudinal states.

3 ATTITUDE REPORTS

3.1 *Observations*

In English report verbs with non-finite complements are temporally *de se* in the sense of Lewis (1979). That is, the complement situation is located in time relative to the attitude holder's now. In Kalaallisut closest equivalents are derivational report suffixes (RPT-*suffixes*). Temporal anaphora shows that RPT-suffixes introduce attitudinal states (33a, c) or speech events (33b, d). The attitude or speech can be fact-oriented (33a, b) or prospect-oriented (33c, d). For fact-oriented RPT-suffixes, the RPT-event acts as the perspective point for locating the base-event, just like the speech act does when the same base is inflected for fact-oriented mood. In either case, future location times are ruled out, as fact-oriented RPT-suffixes in (33a, b) and moods (DEC in (10), FCT in (11)) attest. In contrast, prospect-oriented RPT-suffixes (33c, d) and moods (OPT in (7c), IMP in (7d)) allow future location times.

(33)   RPT-suffixes (sample)

      a. *Irni-ni*   (**aqagu*)   *ajugaa*-suri-*pa-a.*

         son-$3S_T.^{\perp}$ (*tomorrow) win-$bel_{\perp}$-DEC_{tv}-$3S_{(T)}.3S_{(\perp)}$

         He$_T$ believes his$_T$ son to have won (*tomorrow).

      b. *Irni-ni*   (**aqagu*)   *ajugaa*-nirar-*pa-a.*

         son-$3S_T.^{\perp}$ (*tomorrow) win-$say_{\perp}$-DEC_{tv}-$3S_{(T)}.3S_{(\perp)}$

         He$_T$ has said his$_T$ son has won (*tomorrow).

      c. (*Aqagu*)   *isir*-{-niar | -ssa | -qina}-*pu-q.*

         (tomorrow) enter-{$-int_{se}^{>}$ | $-exp^{>}$ | $-dread^{>}$}-DEC_{iv}-$3S_{(T)}$

         He$_T$ {intends | is expected | is liable} to drop in (tomorrow).

      d. *Ikinngut-ni* (*aqagu*)   *isir*-qqu-*pa-a.*

         friend-$3S_T.^{\perp}$ (tomorrow) enter-$bid_{\perp}^{>}$-DEC_{tv}-$3S_{(T)}.3S_{(\perp)}$

         He$_T$ has invited his$_T$ friend to drop in (tomorrow).

      Kalaallisut also has RPT-*roots*. These are lexically unspecified as either fact- or prospect-oriented, but they can be syntactically specified by a compatible RPT-suffix in topic-elaborating mood (ELA$_T$, see (34)).

(34)   RPT-roots elaborated by RPT-suffixes

      a. *Ole* **niriuk**-*pu-q*   *ajugaa*-**ssa**-*llu-ni.*

         Ole *hope*-DEC_{iv}-$3S_{(T)}$ win-$des^{>}$-ELA_T-$3S_T$

         Ole hopes to win.

b. *Ole-p   ikinngut-ni* **uqar**-*vvigi-pa-a*   *isir-**qqu**-llu-gu.*
    Ole-ERG   friend-3S$_\top$ *say*-to-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\bot)}$ enter-*bid*$^{\triangleright}_\bot$-ELA$_\top$-3S$_\bot$
    Ole has invited his friend to drop in.

c. *Ole*   **isuma-qar**-*pu-q*   *irni-ni*   *ajugaa-**suri**-llu-gu.*
    Ole   *idea-have*-DEC$_{iv}$-3S$_{(\top)}$ son-3S$_\top$.$^\bot$ win-*bel*$_\bot$-ELA$_\top$-3S$_\bot$
    Ole believes his son to have won.

d. *Ole-p   * **uqar**-*vvigi-pa-a-nga*   *irni-ni*   *ajugaa-**nirar**-llu-gu.*
    Ole-ERG   *say*-to-DEC$_{tv}$-3S$_{(\top)}$-1S   son-3S$_\top$.$^\bot$ win-*say*$_\bot$-ELA$_\top$-3S$_\bot$
    Ole has told me that his son has won.

We thus arrive at the following observation (see also Bittner 2005):

OBSERVATION 2. Derivational RPT-suffixes introduce:
i.   fact-oriented attitudinal states (e.g. *-suri* 'bel$_\bot$', *-paluk* 'seem')
ii.   fact-oriented reporting events (e.g. *-nirar* 'say$_\bot$')
iii.   prospect-oriented attitudinal states (e.g. *-ssa* 'exp$^\triangleright$|des$^\triangleright$', *-niar* 'int$_{se}^\triangleright$')
iv.   prospect-oriented directive events (e.g. *-qqu* 'bid$_\bot^\triangleright$')

As noted in §1, Kalaallisut conditionals are a species of prospect-oriented RPT-reports (recall (2)–(3)). I propose that the antecedent introduces a topical hypothesis (HYP), and the comment is an RPT-report that introduces a prospect-oriented attitudinal state directed toward that modal topic, $\top\Omega$. In the $\top\Omega$-worlds that best fit the projections of the RPT-*ego*, looking from a salient $\top\Omega$-event e, the projected RPT-base event is realized within the consequent state of e and is a verifiable fact by the end of the RPT-attitudinal state. In contrast, fact-oriented RPT-suffixes are temporally and modally *de se*. The RPT-base event is realized before the beginning of the RPT-state and in the same modality. That is, according to the RPT-*ego*, the RPT-base event is a verifiable fact from the beginning of the RPT-attitudinal state. §3.2–3.3 formalize the modal and temporal components of this proposal.

3.2 *Attitudes to own vs. topical modalities*

Modally, fact- and prospect-oriented RPT-reports differ as follows. In fact-oriented RPT-reports the RPT-*ego* holds an attitude (or makes a claim) that is realized in the ideal worlds of his own modality. In contrast, in prospect-oriented RPT-reports the RPT-*ego* makes a projection (or issues a directive) that is realized in the ideal worlds of the topical modality.

To explicate this idea I propose to modify the standard modal theory of attitudes (Hintikka 1969). On this theory, *x believes p* is true in a world *w*

iff every world where all of x's w-beliefs are true is a p-world. This wrongly predicts that x believes every proposition if x holds conflicting w-beliefs (e.g. that all men are created equal and that a man has a right to own slaves) so they cannot all be true. This type of problem is well known from conditionals and so is the solution—to wit, to quantify only over the best-fitting worlds (Lewis 1973, 1981, Kratzer 1981). Given a set of propositions Q, w is Q-*better* than v, written $v \angle_Q w$, iff every Q-propositions that holds in v also holds in w but not vice versa. The *ideal* of an ordered set $\langle p, \angle_Q \rangle$, written MAX$(p, Q)$, is the set of p-worlds that are not outranked by any Q-better p-world. In particular, I propose that worlds can be ranked by beliefs, desires, or other attitudes. Table 3 implements this idea in UC_ω and UC.

Table 3 drt-abbreviations for attitude-related $UC_{(\omega)}$-terms

i. Attitudinal p-sets, ranking, and ideals ($att \in \{bel, exp, des, \dots\}$)

$att_w\, x_\delta$ for $\lambda p_\Omega.\ att(w, x, p)$ (UC_ω)

$att_w\, s_\sigma$ for $\lambda p_\Omega.\ att(w, s, \text{CTR}\, s, p)$ (UC)

$att_w\, e_\varepsilon$ for $\lambda p_\Omega.\ \exists s_\sigma(att(w, s, \text{CTR}\, e, p) \wedge \vartheta_w e \subset \vartheta_w s)$ (UC)

$v \angle_Q w$ for $\lambda p_\Omega(p \in Q \wedge v \in p) \subset \lambda p_\Omega(p \in Q \wedge w \in p)$

MAX(p, Q) for $\lambda w_\omega.\ w \in p \wedge \neg\exists v(v \in p \wedge w \angle_Q v)$

ii. Related drt-projections and updates ($a \in \text{DR}(\Theta), \mathbf{R} \in \{\in, \notin\}$)

MAX$\langle B, att_W A \rangle$ for $\lambda I_{st}\lambda i_s.\ \text{MAX}(B°i, att_{W°i}\, A°i)$

MAX$\{B\|, att_W A\}$ for $\lambda I_{st}\lambda i_s.\ \text{MAX}(B\{I\}, att_{W°i}\, A°i)$

$B\|$ for $\lambda I_{st}\lambda i_s.\ B\{I\}$

$B\|_{C1,\dots Cn}$ for $\lambda I_{st}\lambda i_s.\ B\{\lambda j_s(Ij \wedge C_1 j = C_1 i \wedge \dots C_n j = C_n i)\}$

$[A_{(st)sat} \subseteq B_{(st)sat}]$ for $\lambda I_{st}\lambda j_s.\ Ij \wedge AIj \subseteq BIj$

$[A_{sa}\, \mathbf{R}\, B_{(st)sat}]$ for $\lambda I_{st}\lambda j_s.\ Ij \wedge Aj\, \mathbf{R}\, BIj$

Sample entries for a fact-oriented RPT-suffix -*suri* 'bel$_\perp$', a prospect-oriented RPT-suffix -*ssa* 'exp$^>$|des$^>$', and an RPT-root *niriuk*- 'hope' are given below. According to the RPT-*ego* of '-bel$_\perp$' (grammatical subject $\underline{x}$), the RPT-base ($\underline{V}$) is a verifiable fact in those worlds of his own modality ($\underline{w}\|$) that best fit his ($\underline{w}$-)beliefs. This explicates the idea of modal *de se*. In contrast, the unspecified RPT-*ego* (δ-anaphor, $?\delta$) of the prospect-oriented RPT-suffix '-exp$^>$' projects that the RPT-base ($\underline{V}$) will become a verifiable fact in those worlds of the topical modality ($\top\Omega$) that best fit his ($\underline{w}$-)expectations. Finally, the RPT-root 'hope-' has unspecified modal base (Ω-anaphor, $?\Omega$).

-bel$_\perp$ |—   (s̲\pn)\s̲: $\lambda \underline{V}_{[s\omega]}\lambda x_{s\delta}\lambda \underline{w}_{s\omega}.\ \underline{V} \perp \omega;\ [\text{MAX}\{\underline{w}\|, bel_{\underline{w}}\ x\} \subseteq \perp\omega\|_\perp\delta]$

-exp$^{>}$ |—   s̲\s̲: $\lambda \underline{V}_{[s\omega]}\lambda \underline{w}_{s\omega}.\ \underline{V} \perp \omega;\ [\text{MAX}\langle \top\Omega, exp_{\underline{w}}\ ?\delta\rangle \subseteq \perp\omega\|]$

hope- |—   s̲\pn: $\lambda \underline{x}_{s\delta}\lambda \underline{w}_{s\omega}.\ [\text{MAX}\langle ?\Omega, hope_{\underline{w}}\ x\rangle \subseteq \perp\omega\|]$

For example, the fact-oriented RPT-report (35) translates into (36). In the topical speech world ($\top\omega$) Ole has a belief about his own modality ($\top\omega\|$). In the top-ranked ($\top\omega\|$-)worlds his son's victory is a verifiable fact.

(35) *Ole-p   irni-ni   (*aqagu)   ajugaa-suri-pa-a.*
Ole-ERG$^\top$ son-3S$_\top$.$^\perp$ (*tomorrow) win-*bel*$_\perp$-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$
Ole believes his son to have won (*tomorrow).

(36) $^\top[x|\ x =_i ole];\ [y|\ son_{\top\omega}\langle y, \top\delta\rangle];\ ^P[spk_{\top\omega}\langle I\rangle];\ [v|\ win_v\langle \perp\delta\rangle];\ [\text{MAX}\{\top\omega\|$
$, bel_{\top\omega}\top\delta\} \subseteq \perp\omega\|_\perp\delta];\ ^\top[p|\ p = \top\omega\|]$

In discourse (37i, ii), Ole's state of hope and desire (37i) is the basis of a contingent prediction (37ii). Modal reference is explicated in (38i, ii).

(37) i. *Ole   niriuk-pu-q   (aqagu)   ajugaa-ssa-llu-ni.*
Ole *hope*-DEC$_{iv}$-3S$_{(\top)}$ (tomorrow) win-*des*$^{>}$-ELA$_\top$-3S$_\top$
Ole hopes to win (tomorrow).
      ii. *Nulia-a   nuannaar-ssa-pu-q.*
wife-3S$_\perp$.$^\top$ happy-*exp*$^{>}$-DEC$_{iv}$-3S$_{(\top)}$
His wife will be happy.

(38) i. $^\top[x|\ x =_i ole];\ ^P[spk_{\top\omega}\langle I\rangle];\ [v|\ win_v\langle \top\delta\rangle];\ [\text{MAX}\langle \top\Omega, des_{\top\omega}\top\delta\rangle \subseteq$
$\perp\omega\|];\ [\text{MAX}\{\top\Omega, hope_{\top\omega}\top\delta\} \subseteq \perp\omega\|];\ ^\top[p|\ p = \top\omega\|]$
      ii. $[y|\ y = \top\delta];\ ^\top[x|\ wife_{\top\omega}\langle x, \perp\delta\rangle];\ ^P[spk_{\top\omega}\langle I\rangle];\ [happy_{\perp\omega}\langle \top\delta\rangle];$
$[\text{MAX}\langle \top\Omega, exp_{\top\omega} I\rangle \subseteq \perp\omega\|];\ ^\top[p|\ p = \top\omega\|]$

In the input to (38i) the topical modality ($\top\Omega$) is the initial common ground (by default, D7$_\omega$). The topic-elaborating mood (-ELA$_\top$) on a state of desire identifies it with the matrix state of hope. The latter must therefore have the same modal base, $\top\Omega$. Within this topical modality, the topical Ole wins in every world that best fits what he desires and hopes in the topical speech world ($\top\omega$). The topical modality is updated to the set of surviving speech worlds, where Ole is in this attitudinal state. (38ii) represents the salient reading of (37ii), where the RPT-ego ($?\delta$) is resolved to the speaker and the expectation is contingent on Ole's victory (anaphora to winning

worlds by $\bot\omega$). In the topical speech world ($\top\omega$) the speaker has a certain expectation about the current topical modality ($\top\Omega$), i.e. the updated common ground where Ole is in the aforementioned state of desire and hope. In the worlds of this topical modality that best fit the speaker's ($\top\omega$-) expectations, Ole does win (anaphora by $\bot\omega$) and his ($\top\omega$-)wife is happy.

In summary, fact-oriented RPT-suffixes are modally *de se*, prospect-oriented RPT-suffixes are *de $\top\Omega$*, and RPT-roots are modally unspecified.

3.3 *Subjective facts vs. projected consequences*

Attitudinal states have a beginning and an end, like all human states. Throughout life we form and abandon beliefs, expectations, desires, regrets, anxieties, and so on. At any point we may wish to talk about past, present, or future attitudinal states. In the temporally explicit language of UC an attitudinal *p*-set is therefore based not on an individual, but on an attitudinal state or on a concurrent event centered on the attitude holder (see Table 3.i).

Enriched with temporal reference, the proposed lexical entries for RPT-suffixes and RPT-roots are given below. According to the *ego* (CTR $\bot\sigma$) of a fact-oriented RPT-suffix, e.g. '-bel$_\bot$', the event of the RPT-base (EVT $\bot a$) is a currently verifiable fact. That is, it is realized in the same world as, and before the beginning of, this attitudinal state. In contrast, the *ego* of a prospect-oriented RPT-suffix, e.g. '-exp$^>$', views the event of the RPT-base (EVT $\bot a$) as a projected consequence of a contextually salient event (?ε). In the ideal worlds of the topical domain ($\top\Omega$) the projected consequence is a verifiable fact by the end of this prospect-oriented attitudinal state.

-bel$_\bot$ $\vdash$ (s\pn)\s: $\lambda\underline{V}\lambda x\lambda\underline{w}.(\underline{V} \bot\omega {}^\bot; [t|\ \vartheta_{\bot\omega}\ \text{EVT}\bot a <_i t, t \subset_i \vartheta_{\bot\omega}\ \text{STA}\bot a])$

  ; $[s|\ \vartheta_{\underline{w}}\ s =_i \bot\tau, \text{CTR}\ s =_i\underline{x}]; [\text{MAX}\{\underline{w}\|, bel_{\underline{w}} \bot\sigma\} \subseteq \bot\omega\|_{\bot\sigma,\ \bot\delta}]$

-exp$^>$ $\vdash$ $\underline{s}$\s: $\lambda\underline{V}\lambda\underline{w}.(\underline{V} \bot\omega {}^\bot; [\text{EVT}\bot a \subset_{\bot\omega} \text{CON ?}\varepsilon]); [s|\ \text{EVT}\bot a <_{\bot\omega} \text{END}\ s$

  $]; [\text{MAX}\{\top\Omega, exp_{\underline{w}} \bot\sigma\} \subseteq \bot\omega\|_{\bot\sigma}]$

hope- $\vdash$ $\underline{s}$\pn: $\lambda\underline{x}\lambda\underline{w}. [s|\ \text{CTR}\ s =_i x]; [\text{MAX}\{?\Omega, hope_{\underline{w}} \bot\sigma\} \subseteq \bot\omega\|_{\bot\sigma}\}]$

This correctly predicts that only prospect-oriented RPT-reports allow future location times. For discourse (37i, ii) temporal reference is explicated in (39i, ii). In (39i) topic-elaborating mood on a state of desire identifies it with the topical Ole's state of hope, by equating both with the same topical state. The representation is coherent because tomorrow-$_\varepsilon$ locates the desired

victory, whereas the attitudinal state of desire is verifiable now. In (39ii) the wife's happy state is an expected consequence of Ole's victory.

(39i)   (37i) Ole hopes to win tomorrow.

Ole-$^\top$ hope-DEC$_{iv}$-3S$_{(\top)}$ tomorrow-$_\varepsilon$ win-des$^>$-ELA$_\top$-3S$_\top$

$^\top[x|\ x =_i ole]$; $^P[spk_{\top\omega}\langle\top\varepsilon, \text{CTR}\top\varepsilon\rangle]$; $((^\top[s]; [e\ v|\ win_v\langle e, \text{CTR}\ \top\sigma\rangle, \vartheta_v\ e$ $\subseteq_i tmr_{\top\omega}\top\varepsilon, e \subset_v \text{CON}\top\varepsilon]$; $[s|\ \bot\varepsilon <_{\bot\omega} \text{END}\ s]$; $[\text{MAX}\langle\top\Omega, des_{\top\omega}\bot\sigma\rangle \subseteq$ $\bot\omega\|\bot\sigma]$; $[\top\sigma =_i \bot\sigma])$ $^\top$; $([s|\ \text{CTR}\ s =_i \top\delta]$; $[\text{MAX}\langle\top\Omega, hope_{\top\omega}\ \bot\sigma\rangle \subseteq$ $\bot\omega\|\bot\sigma]$; $[\top\sigma =_i \bot\sigma]))$; $[\top\tau \subset_i \vartheta_{\top\omega}\bot\sigma, \text{BEG}\bot\sigma <_{\top\omega}\top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$

(39ii)   (37ii) His wife will be happy.

wife-3s$_\bot$.$^\top$ happy-exp$^>$-DEC$_{iv}$-3S$_{(\top)}$

$[y|\ y =_i \top\delta]$; $^\top[x|\ wife_{\top\omega}\langle x, \bot\delta, \top\tau\rangle]$; $^P[spk_{\top\omega}\langle\top\varepsilon, \text{CTR}\top\varepsilon\rangle]$; $[s|\ happy_{\bot\omega}$ $\langle s, \top\delta\rangle, \text{BEG}\ s \subset_{\bot\omega} \text{CON}\ \bot\varepsilon]$; $[s|\ \text{BEG}\ \bot\sigma <_{\bot\omega} \text{END}\ s]$; $[\text{MAX}\langle\top\Omega, exp_{\top\omega}$ $\bot\sigma\rangle \subseteq \bot\omega\|\bot\sigma]$; $[\top\tau \subset_i \vartheta_{\top\omega}\ \bot\sigma, \text{BEG}\ \bot\sigma <_{\top\omega}\top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$

In contrast, a future location time cannot be coherently added to the temporally explicit representation (40) of the fact-oriented belief report (35). The declarative mood asserts that Ole is in a speech act ($\top\varepsilon$-)verifiable state of belief. The beginning of this attitudinal state must therefore precede the speech act. But it also serves as the perspective point for Ole, the attitude holder, and according to him his son's victory is verifiable from that point. But then the son's victory cannot be located in the future of the speech act.

(40)   (35) Ole believes his son to have won (*tomorrow).

Ole-ERG$^\top$ son-3S$_\top$.$^\bot$ (*tomorrow-$_\varepsilon$)   win-bel$_\bot$-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\bot)}$

$^\top[x|\ x =_i ole]$; $[y|\ son_{\top\omega}\langle y, \top\delta, \top\tau\rangle]$; $^P[spk_{\top\omega}\langle\top\varepsilon, \text{CTR}\ \top\varepsilon\rangle]$; $[t\ e\ v|$ $win_v\langle e, \bot\delta\rangle, \vartheta_v\ e <_i t, t \subset_i \vartheta_v\ \text{CON}\ e]$; $[s|\ \vartheta_{\top\omega}\ s =_i \bot\tau, \text{CTR}\ s =_i \top\delta]$; $[\text{MAX}\langle\top\omega\|, bel_{\top\omega}\ \bot\sigma\rangle \subseteq \bot\omega\|_{\bot\sigma, \bot\delta}]$; $[\top\tau \subset_i \vartheta_{\top\omega}\ \bot\sigma, \text{BEG}\bot\sigma <_{\top\omega}\top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$

In summary, RPT-suffixes in fact-oriented moods introduce currently verifiable attitudinal states (or speech events). If the RPT-suffix is likewise fact-oriented, then the RPT-*ego* views the RPT-base event as a currently verifiable fact of his own modality. If the RPT-suffix is prospect-oriented, then he views it as a projected consequence of a contextually salient event. In his ideal worlds of the topical modality the projected event becomes a verifiable fact by the end of the prospect-oriented attitudinal state.

4 CONDITIONAL ATTITUDES

4.1 *Observations*

Cross-linguistically, conditionals are modal topic-comment structures (see e.g. Haiman 1978, Bittner 2001, Ebert *et al.* 2008). The antecedent introduces a topical sub-domain of a salient modal base (Kratzer 1981, Bittner *t.a.*), while the matrix comment introduces, or implies, an attitudinal state directed toward this topical sub-domain ($\top \Omega$).

In Kalaallisut the antecedent is in the prospect-oriented hypothetical mood (HYP) and the attitudinal matrix comment must contain a *prospect-oriented attitudinal correlate,* on pain of ungrammaticality (*). The correlate can be a derivational RPT-suffix (e.g. (41a, b), (42a, b)), prospect-oriented matrix mood (e.g. OPT in (41c)), or an evaluative implicitly attitudinal root that can be read as prospect-oriented (e.g. *ajunngit-* 'fine' in (42c)).

(41)   *Ole   ajugaa-gu-ni …*
       Ole   win-HYP$_\top$-3S$_\top$ …
       If (or when) Ole$^\top$ wins…
       a. *… isir-{-ssa | -qina | -sinnaa}-pu-q.*
          … enter-{-*exp*$^>$ | -*dread*$^>$ | -*poss*$^>$}-DEC$_\text{iv}$-3S$_{(\top)}$
          … he is {expected to | liable to | might} drop in.
       b. *… isir-{-ssanga | -niar | -rusuk}-pu-q.*
          … enter-{-*exp*$_{se}^>$ | -*int*$_{se}^>$ | -*des*$_{se}^>$}-DEC$_\text{iv}$-3S$_{(\top)}$
          … he {expects | intends | wants} to drop in.
       c. *… isir-{-li! | *-pu-q.}*
          … enter-{-*OPT*.3S$_{(\top)}$ | *-*DEC*$_\text{iv}$-3S$_{(\top)}$}
          … let him$_\top$ drop in! | *he$_{(\top)}$ has dropped in.

(42)   *Ole   ajugaa-pp-at …*
       Ole   win-HYP$_\bot$-3S$_\bot$ …
       If (or when) Ole$^\bot$ wins…
       a. *… Aani-p   isir-{-ssangatit | *-suri}-pa-a.*
          … Ann-ERG enter-{-*exp*$_\bot^>$ | *-*bel*$_\bot$}-DEC$_\text{tv}$-3S$_{(\top)}$.3S$_{(\bot)}$
          … Ann {expects him to drop in|*believes him to have dropped in}.
       b. *… Aani-p   isir-{-qqu | *-nirar}-pa-a.*
          … Ann-ERG enter-{-*bid*$_\bot^>$ | *-*say*$_\bot$}-DEC$_\text{tv}$-3S$_{(\top)}$.3S$_{(\bot)}$
          … Ann has {told him to drop in|*said he has dropped in}.

c.   … *ajunngit-la-q* | **nuannaar-pu-nga.*
    … *fine*-DEC-3S$_{(T)}$ | *happy-DEC$_{iv}$-1S
    … that's fine (by me). | *intended: I am happy.

OBSERVATION 3. A hypothetical dependent (HYP) requires a prospect-oriented attitudinal correlate in the matrix, on pain of ungrammaticality.

I propose to derive this observation from topic-comment sequencing. By definition, a topic-comment sequence (A $^{\mathsf{T}}$; B) reduces to a plain sequence (A; B), iff the topic update A extends the input T-list with at least one semantic object, and the primary topical object in the output of A is referred to in the comment B by an anaphor $\mathsf{T}a$ ($:= \mathsf{T}a_1$), for some type a, and maintains its $\mathsf{T}a$-prominence rank (i.e. no further $\mathsf{T}a$ update) in the comment. Otherwise, the topic-comment sequence reduces any input state of infotention to the absurd state ($\varnothing$, by D6). Conditionals are topic-comment sequences with $a = \varOmega$. In Kalaallisut the hypothetical dependent introduces $^{\mathsf{T}}$; and an $\varOmega$-topic, whereas the $\mathsf{T}\varOmega$-anaphor comes from the correlate.

4.2 *Conditional = modal topic + attitudinal comment*

In Kalaallisut the dependent hypothetical mood (HYP) forms a modal topic-comment sequence with the verbal base s of the modified head (see §6 for compositional details). The modal topic is the set of worlds, within a salient modal base ($?\omega\|$), where the antecedent hypothesis (iv) is realized. The modified verbal base s must comment on this topical sub-domain, lest the output of the topic-comment sequence (A $^{\mathsf{T}}$; B) be the absurd state ($\varnothing$, by D6$_\omega$). That is why the modified s must contain a $\mathsf{T}\varOmega$-anaphor.

-HYP |– (s/s)\pn\iv: $\lambda \underline{P} \lambda \underline{x} \lambda \underline{V} \lambda \underline{w}.(\underline{P}\,\underline{x} \perp \omega; [\perp \omega \in ?\omega\|]; {}^{\mathsf{T}}[p|\, p = \perp \omega\|])$ $^{\mathsf{T}}$; $\underline{V}\,\underline{w}$

For example, in discourse (43i, ii) a report of a conditional promise by Ole (43i) is followed by a modally subordinated conditional prediction (43ii), contingent both on its own antecedent and on Ole making good on his promise. Modal reference is explicated in (44i, ii). In (44i) the antecedent clause introduces a topical hypothesis: the set of worlds, within the common ground ($\mathsf{T}\omega\|$), where Ole wins. In the consequent this topical sub-domain ($\mathsf{T}\varOmega$) is the modal base of an attitudinal comment. This introduces Ole's promise as a speech world ($\mathsf{T}\omega$-)verifiable speech event resulting in a ($\mathsf{T}\omega$-)verifiable state of obligation and expectation. In the antecedent ($\mathsf{T}\varOmega$-)worlds that best fit Ole's ($\mathsf{T}\omega$-)obligations and expectations he drops in.

Note that Ole need not expect and has not promised to win. His promise and expectation are contingent on his victory, which may be a long shot.

(43) i. *Ole ajugaa-gu-ni   niriursui-pu-q   isir-ssa-llu-ni.*
          Ole win-HYP$_\top$-3S$_\top$ *promise*-DEC$_{iv}$-3S$_{(\top)}$ enter-$exp^>$-ELA$_\top$-3S$_\top$
          If Ole$^\top$ wins, he$_\top$ has promised to drop in.
    ii. *Nulia-ra   viinni-si-pp-at   nuannaar-ssa-pu-q.*
          wife-1S.$^\perp$ wine-get-HYP$_\perp$-3S$_\perp$ happy-$exp^>$-DEC$_{iv}$-3S$_{(\top)}$
          If my wife gets some wine, he$_\top$'ll be happy.

(44) i. $^{\mathrm{P}}[spk_{\top\omega}\langle \mathrm{I}\rangle]$; $(^\top[x|\, x =_i ole]$; $[v|\, win_v\langle \top\delta\rangle]$;$[\perp\omega \in \top\omega\|]$; $^\top[p|\, p =\perp\omega\|])$
          $^\top$; $([enter_\perp\omega\langle \top\delta\rangle])$; $[\mathrm{MAX}\langle \top\Omega, exp_{\top\omega}\top\delta\rangle \subseteq \perp\omega\|]$; $[spk_{\top\omega}\langle\top\delta\rangle]$;
          $[\mathrm{MAX}\langle \top\Omega, obl_{\top\omega}\top\delta\rangle \subseteq \perp\omega\|])$; $^\top[p|\, p = \top\omega\|]$
    ii. $^{\mathrm{P}}[spk_{\top\omega}\langle \mathrm{I}\rangle]$; $([y|\, wife_{\top\omega}\langle y, \mathrm{I}\rangle])$; $[wine.get_\perp\omega\langle\perp\delta\rangle]$; $[\perp\omega \in \top\omega\|]$;
          $^\top[p|\, p = \perp\omega\|])$ $^\top$; $([happy_\perp\omega\langle \top\delta\rangle])$; $[\mathrm{MAX}\langle \top\Omega, exp_{\top\omega}\mathrm{I}\rangle \subseteq \perp\omega\|])$;
          $^\top[p|\, p = \top\omega\|]$

The salient reading of (43ii) is a subordinated conditional prediction. As explicated in (44ii), the declarative matrix introduces a speech world ($\top\omega$-)verifiable state of expectation experienced by the speaker. The modal base ($\top\Omega$) of this attitudinal state is the current antecedent hypotheses, i.e. the sub-class of the promised drop-in worlds (modal anaphora by $\perp\omega$) where the speaker's wife buys some wine. In the modal-base ($\top\Omega$-)worlds that best fit the speaker's ($\top\omega$-)expectations the topical Ole ($\top\delta$) is happy.

Conditional expectations may also concern consequences of past events, as in (the grammatical version of) (45i, ii) analyzed in (46i, ii). In the output of (46i) JFK is assassinated throughout the common ground. The conditional (46ii) introduces a speech world ($\top\omega$-)verifiable state of expectation based on this ($\top\omega$-)verifiable assassination event. The modal base ($\top\Omega$) is the topical sub-domain, of the current common ground ($\top\omega\|$), where the assassin is not Oswald. In the modal base worlds that best fit the attitude holder's projections the assassin is someone else. If the $\top\Omega$-anaphor *-ssa* '-$exp^>$' is omitted from the consequent, the conditional (45ii) becomes ungrammatical and uninterpretable (see (47)). For without a $\top\Omega$-anaphor there is no proper comment, so the modal topic-comment sequence formed by the hypothetical mood reduces any input state (c) to the absurd state ($\varnothing$).

(45) i. *Kennedy   tuqut-taa-pu-q.*
          Kennedy   kill-pssv-DEC$_{iv}$-3S$_{(T)}$
          JFK was assassinated.

      ii. *Oswald-p   tuqut-sima-nngit-pp-a-gu*
          Oswald-ERG   kill-prf-not-HYP$_\perp$-3S$_\perp$-3S$^\perp$

          inuk-piluk-qat-ata   tuqut-sima-*(-ssa)-pa-a.
          man-bad-other-3S$_\perp$.ERG   kill-prf-*(-$exp^>$)-DEC$_{tv}$-3S$_{(T)}$.3S$_{(\perp)}$

          If Oswald didn't kill him, then someone else did.

(46) i. $^\top[x|\ x =_i jfk]$; $^P[spk_{\top\omega}\langle I\rangle]$; $[y|\ kill_{\top\omega}\langle y,\ \top\delta\rangle]$; $^\top[p|\ p = \top\omega||]$
      ii. $^P[spk_{\top\omega}\langle I\rangle]$; $([v\ y|\ y =_i osw,\ kill_v\langle y, \top\delta\rangle]$; $[v|\ v \notin \perp\omega||]$; $[\perp\omega \in \top\omega||]$
          ; $^\top[p|\ p = \perp\omega||])$ $^\top$; $([y|\ y =_i \top\delta]$; $^\top[x|\ man_{\perp\omega}\langle x\rangle]$; $[bad\{\top\delta,\ \top\delta||_{\perp\omega}\}]$;
          $[\perp\delta_2 \in \top\delta||]$; $[\top\delta \neq_i \perp\delta_2]$; $[kill_{\perp\omega}\langle\top\delta,\ \perp\delta\rangle]$; $[\text{MAX}\langle\top\varOmega,\ exp_{\top\omega} I\rangle$
          $\subseteq \perp\omega||])$; $^\top[p|\ p = \top\omega||]$

(47) $c[\![^P[spk_{\top\omega}\langle I\rangle]$; $([v\ y|\ y =_i osw,\ kill_v\langle y,\ \top\delta\rangle]$; $[v|\ v \notin \perp\omega||]$; $[\perp\omega \in \top\omega||]$
      ; $^\top[p|\ p = \perp\omega||])$ $^\top$; $([y|\ y =_i \top\delta]$; $^\top[x|\ man_{\top\omega}\langle x\rangle]$; $[bad\{\top\delta,\ \top\delta||_{\top\omega}\}]$;
      $[\perp\delta_2 \in \top\delta||]$; $[\top\delta \neq_i \perp\delta_2]$; $[kill_{\top\omega}\langle\top\delta,\ \perp\delta\rangle])$; $^\top[p|\ p = \top\omega||]]\!]^g = \varnothing$

4.3 *Projected consequences in topical sub-domains*

To factor in temporal reference we first spell it out in the entries of two key moods: hypothetical (HYP) and topic-elaborating (ELA$_\top$). Hypothetical mood is prospect-oriented. It introduces a topical sub-domain (of ?$\omega||$) where the event of the verbal base (EVT $\perp a$) is realized after a salient perspective point (?ε). In contrast, topic-elaborating mood is temporally (and modally) *de se*: it identifies the dependent state (STA $\perp a$) with the matrix state (STA $\perp b$) by equating both with its own topical state.

-HYP $\vdash$ (s/s)\pn\iv: $\lambda \underline{P}\lambda x\lambda \underline{V}\lambda w.$ $((\underline{P}\,\underline{x}\ \perp\omega\ ^\top$; $[?\varepsilon <_{\perp\omega} \text{EVT}\perp a])$; $[\perp\omega \in\ ?\omega||]$
      ; $^\top[p|\ p = \perp\omega||])$ $^\top$; $\underline{V}\,\underline{w}$

-ELA$_T$ $\vdash$ (s/s)\pn\iv: $\lambda\underline{P}\lambda x\lambda\underline{V}\lambda w$. ($^T[s]$ ^{T}; ($\underline{P}\,x\,\underline{w}$ $^\perp$; [$\top\sigma=_i$ STA $\perp a$])) ^{T}; ($\underline{V}\,w$

$\qquad$ $^\perp$; [$\top\sigma=_i$ STA $\perp b$])

Both moods are exemplified in discourse (43i, ii). Temporal reference is analyzed in (48i, ii), extending the analysis of modal reference in (44i, ii):

(48i) (43i) If Ole^T wins, he$_T$ has promised to drop in.

$\qquad$ (-DEC$_{iv}$) $\qquad\qquad\qquad$ Ole^T win-HYP$_T$-3S$_T$ …

$\qquad$ $^P[spk_{\top\omega}\langle\top\varepsilon,$ CTR $\top\varepsilon\rangle]$; (($^T[x|\,x=_i\,ole]$; [$e\,v|\,win_v\langle e,\top\delta\rangle,\top\varepsilon<_v e]$; [$\perp\omega$

$\qquad$ $\in\top\omega\|]$; $^T[p|\,p=\perp\omega\|])$ ^{T}; …

$\qquad$ … promise-DEC$_{iv}$-3S$_{(T)}$ enter-$exp^>$-ELA$_T$-3S$_T$

$\qquad$ … (($^T[s]$; [$e|\,enter_{\perp\omega}\langle e,$ CTR $\top\sigma\rangle,\,e\subset_{\perp\omega}$ CON $\perp\varepsilon]$; [$s|\,\perp\varepsilon<_{\perp\omega}$ END $s]$;

$\qquad$ [MAX$\langle\top\varOmega, exp_{\top\omega}\,\perp\sigma\rangle\subseteq\,\perp\omega\|_{\perp\sigma}]$; [$\top\sigma=_i\,\perp\sigma])$ ^{T}; ([$e|\,spk_{\top\omega}\langle e,\top\delta\rangle]$;

$\qquad$ [MAX$\langle\top\varOmega, obl_{\top\omega}$ CON $\perp\varepsilon\rangle\subseteq\,\perp\omega\|_{\perp\epsilon}\}]$; [$\top\sigma=_i$ CON $\perp\varepsilon])))$; [$\top\tau\subset_i$

$\qquad$ CON $\perp\varepsilon,\,\perp\varepsilon<_{\top\omega}\top\varepsilon]$; $^T[p|\,p=\top\omega\|]$

(48ii) (43ii) If my wife$^\perp$ gets some wine, he$_T$'ll be happy.

$\qquad$ (-DEC$_{iv}$) $\qquad\qquad\qquad\qquad$ wife-1S.$^\perp$ wine-get-HYP$_\perp$-3S$_\perp$…

$\qquad$ $^P[spk_{\top\omega}\langle\top\varepsilon,$ CTR $\top\varepsilon\rangle]$; (([$y|\,wife_{\top\omega}\langle y,$ CTR $\top\varepsilon,\top\tau\rangle]$; [$e|\,wine_{\perp\omega}\langle$BCK $e,$

$\qquad$ $\vartheta_{\perp\omega}\,e\rangle,\,get_{\perp\omega}\langle e,\perp\delta,$ BCK $e\rangle,\top\varepsilon<_{\perp\omega}e]$; [$\perp\omega\in\top\omega\|]$; $^T[p|\,p=\perp\omega\|])$ ^{T};

$\qquad$ … happy-$exp^>$-DEC$_{iv}$-3S$_{(T)}$

$\qquad$ … ([$s|\,happy_{\perp\omega}\langle s,\top\delta\rangle,$ BEG $s\subset_{\perp\omega}$ CON $\perp\varepsilon]$; [$s|$ BEG $\perp\sigma<_{\perp\omega}$ END $s]$;

$\qquad$ [MAX$\langle\top\varOmega, exp_{\top\omega}\,\perp\sigma\rangle\subseteq\,\perp\omega\|_{\perp\sigma}]))$; [$\top\tau\subset_i\vartheta_{\top\omega}\,\perp\sigma,$ BEG $\perp\sigma<_{\top\omega}\top\varepsilon]$;

$\qquad$ $^T[p|\,p=\top\omega\|]$

In (48i) the hypothetical antecedent introduces a topical sub-domain of the common ground ($\top\omega\|$) where Ole wins after this speech act ($\top\varepsilon$). The matrix is required to comment (^{T};). The comment is an attitude report: in the speech world ($\top\omega$) Ole has made a promise resulting in a ($\top\varepsilon$-) current state of obligation-and-expectation in regard to the antecedent sub-domain ($\top\varOmega$). In the antecedent winning worlds that best fit his ($\top\varepsilon$-)current promise Ole drops in within the consequent state of his victory (CON $\perp\varepsilon$).

The subordinated conditional prediction (48ii) introduces a ($\top\varepsilon$-) current state of expectation. The modal base (current $\top\varOmega$) is the topical sub-domain, of the promised worlds (modal anaphora by $\perp\omega$), where the current antecedent prospect is realized, i.e. where the speaker's wife buys some wine after this speech act ($\top\varepsilon$). In the modal base ($\top\varOmega$-) worlds that best fit

the ($\top\varepsilon$-)current ($\top\omega$-)expectations of the attitude holder ($\top\varepsilon$-speaker?) there is a happy state of the topical Ole ($\top\delta$) that begins within the consequent state of the wine-buying event (current CON $\bot\varepsilon$).

For the Kennedy discourse (45i, ii), temporal reference is explicated in (49i, ii), building on the analysis of modal reference in (46i, ii).

(49i) ((45i) JFK$^\top$ was assassinated.)

Kennedy-$^\top$ kill-pssv-DEC$_{iv}$-3S$_{(\top)}$

$^\top[x|\ x =_i jfk]$; $^P[spk_{\top\omega}\langle\top\varepsilon,\ \text{CTR}\ \top\varepsilon\rangle]$; $[e|\ kill_{\top\omega}\langle e,\ \text{CTR}\ e,\ \top\delta\rangle,$
$\top\tau\subset_i\vartheta_{\top\omega}\ \text{CON}\ e,\ e <_{\top\omega}\top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$

(49ii) ((45ii) If Oswald$^\bot$ didn't kill him$_\top{}^\bot$, then someone else$^\top$ did.)

(-DEC)   Oswald-ERG$^\bot$ kill-prf-not-HYP$_\bot$-3S$_\bot$-3s$^\bot$…

$^P[spk_{\top\omega}\langle\top\varepsilon,\ \text{CTR}\ \top\varepsilon\rangle]$; $([y|\ y =_i osw]$; $[e\ v|\ kill_v\langle e,\ \bot\delta,\ \top\delta\rangle]$; $[s|\ s =_i$
$\text{CON}\bot\varepsilon,\ \top\tau\subset_i\vartheta_v\ s]$; $[v|\ v\notin\bot\omega\|_{\top\tau}]$; $[s|\ \text{CTR}\ s =_i\bot\delta,\ \top\tau\subset_i\vartheta_{\bot\omega}\ s,$

$\bot\varepsilon_2 <_{\bot\omega}\text{BEG}\ s]$; $[\bot\omega\in\top\omega\|]$; $^\top[p|\ p = \bot\omega\|])\ ^\top$; $([y|\ y = \top\delta];\ …$

…man-bad-other-3S$_\bot$-ERG$^\top$ kill-prf-$exp^>$-DEC$_{tv}$-3S$_{(\top)}$-3S$_{(\bot)}$

…$^\top[x|\ man_{\bot\omega}\langle x,\ \vartheta_{\bot\omega}\bot\varepsilon_2\rangle]$;$[bad\{\top\delta,\top\delta\|_{\bot\omega},\ \vartheta_{\bot\omega}\bot\varepsilon_2\}]$;$[\bot\delta_2\in\top\delta\|]$;
$[\top\delta\neq_i\bot\delta_2]$;$[e|\ kill_{\bot\omega}\langle e,\top\delta,\bot\delta\rangle]$;$[s|\ s =_i\text{CON}\bot\varepsilon,\ \text{BEG}\ s\subset_{\bot\omega}\text{CON}\bot\varepsilon_3]$;
$[s|\ \text{BEG}\bot\sigma <_{\bot\omega}\text{END}\ s]$;$[\text{MAX}\langle\top\varOmega,\ exp_{\top\omega}\bot\sigma\rangle\subseteq\bot\omega\|_{\bot\sigma}])$;$[\top\tau\subset_i\vartheta_{\top\omega}\bot\sigma$
, $\text{BEG}\ \bot\sigma <_{\top\omega}\top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$

In the output of (49i) there is a speech act verifiable assassination event throughout the common ground ($\top\omega\|$). This real event is the basis of the real state of conditional expectation introduced in (49ii). The expectation concerns the topical sub-domain, of the current common ground ($\top\omega\|$), where the assassin is not Oswald. Within this topical sub-domain, the worlds that best fit the attitude holder's expectations are those where the real assassination event (current $\bot\varepsilon_3$) is followed by the consequent state of an assassination (e) by an agent other than Oswald. Since a person can only be assassinated once, this must be the same event ($e =_i \top\varepsilon_3$), whatever the identity of the agent.

In summary, Kalaallisut instantiates the cross-linguistic generalization that conditionals are modal topic-comment sequences. Given a contextually salient modal base, the antecedent introduces a topical sub-domain where a hypothetical prospect, viewed from a contextually salient perspective point, is realized. The comment introduces (or implies) a prospect-oriented attitude

to a projected consequence—of the antecedent event (as in (48i, ii)) or of the input perspectival event (as in (49ii))—in this topical sub-domain. This attitudinal state is a currently verifiable fact even if the modal object of the attitude is not. Indeed, the modal object need not even be considered possible, as §5 shows.

5 ATTITUDES TO REMOTE MODALITIES

5.1 *Observations*

Stone (1997) argues that the anaphoric behavior of English tenses (Reichenbach 1947, Partee 1973, Webber 1988, a.o.) extends to modals. He proposes a parallel anaphoric theory, where temporal relations between the speech time and the topic time, e.g. *past*, *present*, and *future*, are paralleled by modal relations between the speech modality and the topical modality, e.g., *real*, *vivid*, and *remote* (cf. Isard 1974). Stone and Hardt (1999) further propose that the English negation *not* introduces a referent for the scope proposition and asserts that it is disjoint (remote) from the common ground.

   In Kalaallisut discourse reference to remote modalities is expressed by derivational suffixes. For example, the negation suffix *-nngit* 'not' asserts that the world of evaluation is remote from the scope proposition (same as English *not*), and introduces a concurrent non-scope state (see (49ii) and §2). Another 'negative' suffix, *-galuar* 'rem', which often elaborates negation, asserts that the world of evaluation is unexpected, undesirable, or remote from some other attitudinal ideal of a current center of empathy. Typical uses of this suffix are described and exemplified in (50)–(54) below.

OBSERVATION 4. If a verifiable fact has an unexpected or undesirable circumstance, then the fact or the circumstance is marked as remote.

(50)   *Ole ullumi ajugaa-galuar-llu-ni   isir-nngit-la-q.*
       Ole today win-*rem*-ELA$_T$-3S$_T$ enter-not-DEC-1S
       Even though Ole won today, he didn't drop in (was expected in vain).

OBSERVATION 5. An attitude or speech whose modal object is unlikely or undesirable (or unrealized) is marked as remote (or negative).

(51)   i.   *Ole   niriuk-galuar-pu-q   ajugaa-ssa-llu-ni.*
            Ole   hope+*rem*-DEC$_{iv}$-3S$_{(T)}$ win-des$^>$-ELA$_T$-3S$_T$
            Ole hopes to win (long shot).

    ii. *Nulia-a   nuannaar-ssa-*galuar-*pu-q*   (*ajugaa-galuar-pp-at*).
       wife-3S$_\perp$.$^\top$ happy-exp$^>$+*rem*-DEC$_{iv}$-3S$_{(\top)}$ (win-rem-HYP$_\perp$-3S$_\perp$)
       His wife would be happy (if he did win).

(52) i. *Aani-p   Ole aqagu   isir-qqu*+nngit-*la-a.*
       Ann-ERG Ole tomorrow enter-bid$_\perp$$^>$+*not*-DEC-3S$_{(\top)}$.3S$_{(\perp)}$
       Ann has told Ole not to drop in tomorrow.
    ii. *Taamaattumik Ole   isir-ssa*+nngit-*la-q.*
       therefore   Ole enter-exp$^>$+*not*-DEC-3S$_{(\top)}$
       So Ole won't come.

OBSERVATION 6. A counterfactual, unlikely, or undesirable hypothesis is marked as remote (-*rem*-HYP).

(53) i. *Nulia-qar-galuar-llu-nga   miira-qar-nngit-la-nga.*
      wife-have-rem-ELA$_\top$-1S kid-have-not-DEC-1S
      I have a wife, but no kid(s).
    ii. *Irni-qar-*galuar-*gu-ma   ajunngit-niru-tit-galuar-pa-ra.*
      son-have-*rem*-HYP$_\top$-1S fine-er-tv-rem-DEC$_{tv}$-1S.3S$_{(\perp\omega)}$
      I wish I had a son. (*lit.* prefer the remote modality where…)
    iii. *Taava tuqu-gu-ma*
      then   die-HYP$_\top$-1S
      taassuma   nulia-ra   najur-ssa-galuar-pa-a.
      that.ERG   wife-1S.$^\perp$ be.with-exp$^>$-rem-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$
      Then when I die, he would've been there for my wife.

(54) i. *Kennedy   tuqut-taa-pu-q   akira-passuaq-qar-ga-mi.*
      Kennedy   kill-pssv-DEC$_{iv}$-3S$_{(\top)}$ enemy-many-have-FCT$_\top$-3S$_\top$
      Kennedy was assassinated because he had many enemies.
    ii. *Oswald-p   tuqut-sima-nngit-*galuar-*pp-a-gu*
      Oswald-ERG   kill-prf-not-*rem*-HYP$_\perp$-3S$_\perp$-3S$^\perp$
      inuk-piluk-qat-ata   tuqut-sima-ssa+galuar-*pa-a.*
      man-bad-other-3S$_\perp$.ERG kill-prf-exp$^>$+rem-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$
      If Oswald hadn't killed him someone else would've.

     To account for these observations, I propose to build on the basic idea of Stone and Hardt (1999) that negation involves discourse reference to a remote modality. For the negation suffix (-*nngit*) this idea has already been implemented (recall §2 and (46ii)). In addition, I propose that the implicitly

attitudinal remoteness suffix (*-galuar*) asserts that the world of evaluation is remote from (not among) the modal base worlds that are top-ranked by the beliefs, expectations, or desires of a current center of empathy (speaker or topic). Given the proposed analysis of fact-oriented mood, hypothetical mood, and attitude and speech reports, Observations 4–6 are then accounted for, as §5.2–5.3 explicate for modal and temporal reference in turn.

5.2 *Remoteness from attitudinal ideal*

The following lexical entries implement the idea that the remoteness suffix *-galuar* 'rem' implies an attitude to a contextually salient modal base ($?\omega\|$). It asserts that the world of evaluation ($\underline{w}$) is remote from ($\notin$) the top-ranked modal base worlds. The ranking criteria are the beliefs, expectations, or desires of a current center of empathy (the speaker or topic) in the topical speech world ($att_{\top\omega}\ ?\delta$, with $att \in \{bel,\ exp,\ des\}$). The modal base ($?\omega\|$) includes both the topical speech world ($\top\omega$) and the background scope world ($\bot\omega$). The world of evaluation ($\underline{w}$) is one of these two worlds. If the base is itself an attitude, then the remoteness suffix modifies that attitude (-att+rem). What is asserted to be remote is the modal object of the attitude (verbal base of '-att+rem'), not the existence of an attitudinal state (-att).

-rem $\ \vdash\ $ $\underline{s}\backslash\underline{s}$: $\lambda\underline{V}\lambda\underline{w}.\ \underline{V} \bot\omega;\ [\bot\omega,\top\omega \in\ ?\omega\|];\ [\underline{w} \notin \text{MAX}\{?\omega\|, att_{\top\omega}\ ?\delta\}]$

      For example, modal reference in discourse (53i, ii) is analyzed in (55i, ii). (The subordinated counterfactual (53iii) involves temporal anaphora to the wished-for state of having a son, so we postpone its analysis until §5.3.)

(55i) (53i) I have a wife, but no kid(s).

      wife-have-*rem*-ELA$_\top$-1S kid-have-not-DEC-1S

      $^{\text{P}}[spk_{\top\omega}\langle\text{I}\rangle];\ [v|\ wife.have_v\langle\text{I}\rangle];\ [\bot\omega,\ \top\omega \in\ \bot\omega\|];\ [\top\omega \notin \text{MAX}\{\bot\omega\|,$
      $att_{\top\omega}\ \text{I}\}];\ [v|\ kid.have_v\langle\text{I}\rangle];\ [\top\omega \notin \bot\omega\|];\ ^{\text{T}}[p|\ p = \top\omega\|]$

(55ii) (53ii) I wish I had a son.

      son-have-*rem*-HYP$_\top$-1S fine-er-tv-*rem*-DEC$_\text{tv}$-1S.3S$_{(\bot\omega)}$

      $^{\text{P}}[spk_{\top\omega}\langle\text{I}\rangle];\ (([son.have_{\bot\omega}\langle\text{I}\rangle];\ [\bot\omega,\ \top\omega \in\ \bot\omega_2\|];\ [\bot\omega \notin \text{MAX}\{\bot\omega_2\|,$
      $bel_{\top\omega}\ \text{I}\}];\ ^{\text{T}}[p|\ p = \bot\omega\|])\ ^{\text{T}};\ ([\top\omega \angle_{des_{\top\omega}\text{I}} \bot\omega];\ [\top\Omega = \bot\omega\|];\ [\bot\omega,\top\omega$
      $\in \bot\omega_2\|];\ [\top\omega \notin \text{MAX}\{\bot\omega_2\|, des_{\top\omega}\text{I}\}]));\ ^{\text{T}}[p|\ p = \top\omega\|]$

In (55i) the modal base of *-galuar* '-rem' is the scope proposition that the speaker has a wife ($\perp\omega\|$). The world of evaluation (topical speech world, $\top\omega$) is in this domain but not in the speaker's preferred sub-domain. Neither is it in the sub-domain where the speaker has a kid. This suggests that the speaker would prefer a kid-and-wife world to the actual wife-only world. The counterfactual (55ii) makes this explicit. The input modal base is the aforementioned domain where the speaker has a wife (current $\perp\omega_2\|$). The topical hypothesis is the sub-domain where he also has a son. Given the speaker's beliefs, which presumably include (55i), this sub-domain is remote from the wife-only sub-domain the speaker believes he inhabits. The main attitudinal comment is that in the topical speech world ($\top\omega$) the speaker prefers the remote topical sub-domain ($\top\Omega$), where he also has a son, to the speech reality ($\top\omega\|$), where he only has a wife.

In the counterfactual Kennedy discourse, sentence (54i) introduces a verifiable background fact (FCT), and the counterfactual (54ii) projects an expected consequence in a remote modality. Modal reference in this discourse is explicated in (56i, ii).

(56i) (54i) Kennedy was assassinated because he had many enemies.
Kennedy   kill-pssv-DEC$_{iv}$-3S$_{(\top)}$ enemy-many-have-FCT$_\top$-3S$_\top$
$^\top[x|\, x =_i jfk]$; $^P[spk_{\top\omega}\langle I\rangle]$; $[y|\, kill_{\top\omega}\langle y, \top\delta\rangle]$; $^\top[p|\, p = \top\omega\|]$;
$[v|\, have.many.enemies_v\langle\top\delta\rangle]$; $[\top\omega\| \subseteq \perp\omega\|]$

(56ii) (54ii) If Oswald hadn't killed him, someone else would've.
(-DEC$_{tv}$)   Oswald-ERG   kill-prf-not-*rem*-HYP$_\perp$-3S$_\perp$-3S$^\perp$…
$^P[spk_{\top\omega}\langle I\rangle]$; $((([v\, y|\, y =_i osw, kill_v\langle y, \top\delta\rangle]$; $[v|\, v \notin \perp\omega\|]$;$[\perp\omega, \top\omega \in \perp\omega_3\|]$
; $[\perp\omega \notin$ MAX$\{\perp\omega_3\|, bel_{\top\omega}\, I\}]$; $^\top[p|\, p = \perp\omega\|])$ $^\top$; $([y|\, y = \top\delta]$; …
…man-bad-other-3S$_{\perp 2}$-ERG   kill-prf-exp$^>$+rem-DEC$_{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$
$^\top[x|\, man_{\perp\omega}\langle x\rangle]$; $[bad\{\top\delta, \top\delta\|\perp\omega\}]$; $[\perp\delta_2 \in \top\delta\|]$; $[\top\delta \neq_i \perp\delta_2]$;
$[kill_{\perp\omega}\langle\top\delta, \perp\delta\rangle]$; $[\perp\omega, \top\omega \in \perp\omega_3\|]$; $[\perp\omega \notin$ MAX$\{\perp\omega_3\|, bel_{\top\omega}\, I\}]$;
$[$MAX$\langle\top\Omega, exp_{\top\omega}\, I\rangle \subseteq \perp\omega\|]))$; $^\top[p|\, p = \top\omega\|]$

In (56i), after the declarative matrix, JFK is assassinated throughout the output common ground ($\top\omega\|$). The post-posed factual clause adds a background fact—to wit, the larger modal domain where JFK has many enemies ($\perp\omega\|$). In the following counterfactual (56ii) hypothetical mood picks up this background fact as the modal base (current $\perp\omega_3\|$) and introduces the sub-domain where JFK is not assassinated by Oswald as a

topical hypothesis. The remoteness suffix adds that this sub-domain is remote from the speaker's beliefs, i.e. not the modal domain he believes he inhabits. The main attitudinal comment is that within this remote sub-domain, the worlds that best fit the speaker's ($\top\omega$-)expectations are those where some other bad guy assassinates JFK.

5.3 *Projected consequences in remote modalities*

Unlike state-forming RPT-items (e.g. *-suri* 'bel$_\perp$'), which introduce attitude states into discourse, implicitly attitudinal items only imply the existence of an attitude state without making it available for anaphora. The suffix *-galuar* 'rem' is aspect-preserving: its temporally explicit entry differs only in that the perspective point is a concurrent event (?ε), not the attitude holder (?δ).

-rem $\;\vdash\;$ $\underline{s}\backslash\underline{s}$: $\lambda\underline{V}\lambda\underline{w}.\; \underline{V}\perp\omega;\; [\perp\omega, \top\omega \in ?\omega\|];\; [w \notin \text{MAX}\{?\omega\|, att_{\top\omega}\, ?\varepsilon\}]$

     For discourse (53i, ii), temporal reference is explicated in (57i, ii) (building on (55i, ii)). In addition, the subordinated counterfactual (53iii) is analyzed in (57iii), as structured modal and temporal anaphora to a wished-for world and eventuality ($\perp\omega$ and $\perp\sigma_2$, adapting Brasoveanu 2007). More precisely, in (57i) the modal base of *-galuar* 'rem' is the class of worlds where the speaker is married ($\perp\omega\|$). In the topical speech world ($\top\omega$) the speaker is married ($\top\omega \in \perp\omega\|$) at the time of this speech act ($\top\varepsilon$), but the speech world is remote from the speaker's ($\top\omega$-)wishes at the beginning of his marriage (BEG$\perp\sigma$). Moreover, the speaker's ($\top\omega$, $\top\varepsilon$-) current married state is a childless state. This suggests that the speaker would prefer a kid-and-wife world to the actual wife-only world.

(57i) (53i) I have a wife, but no kid(s).

    (-DEC)   wife-have-*rem*-ELA$_\top$-1S …

    $^P[spk_{\top\omega}\langle\top\varepsilon,\; \text{CTR}\; \top\varepsilon\rangle];\; ((^\top[s];\; [s\; v|\; \text{CTR}\; s =_i \text{CTR}\; \top\varepsilon,\; wife_v\langle\text{BCK}\; s,$
    $\text{CTR}\; \top\varepsilon,\; \vartheta_v s\rangle];\; [\perp\omega,\; \top\omega \in \perp\omega\|];\; [\top\omega \notin \text{MAX}\{\perp\omega\|, att_{\top\omega}\, \text{BEG}\; \perp\sigma\}];$
    $[\top\sigma =_i \perp\sigma])^\top;\; …$

    … kid-have-not-DEC-1S

    … $([s\; v|\; \text{CTR}\; s =_i \text{CTR}\; \top\varepsilon,\; kid_v\langle\text{BCK}\; s,\; \text{CTR}\; \top\varepsilon,\; \vartheta_v s\rangle,\; \top\tau \subset_i \vartheta_v s];$
    $[\top\omega \notin \perp\omega\|_{\top\tau}];\; [s|\; \text{CTR}\; s =_i \text{CTR}\; \top\varepsilon,\; \top\tau \subset_i \vartheta_{\top\omega} s];\; [\top\sigma =_i \perp\sigma]));$
    $[\top\tau \subset_i \vartheta_{\top\omega}\; \perp\sigma,\; \text{BEG}\; \perp\sigma <_{\top\omega} \top\varepsilon];\; ^\top[p|\; p = \top\omega\|]$

(57ii) (53ii) I wish I had a son.

    (-DEC$_{tv}$)   son-have-*rem*-HYP$_\top$-1S …

$^P[spk_{\top\omega}\langle\top\varepsilon, \text{CTR}\ \top\varepsilon\rangle]$; $(([s|\ \text{CTR}\ s =_i \text{CTR}\ \top\varepsilon, son_{\perp\omega}\langle\text{BCK}\ s, \text{CTR}\ \top\varepsilon,$

$\vartheta_{\perp\omega}\ s\rangle, s =_i \perp\sigma_2]$; $[\perp\omega, \top\omega \in \perp\omega_2||]$; $[\perp\omega \notin \text{MAX}\{\perp\omega_2||, bel_{\top\omega}\top\varepsilon\}]$;

$[\text{BEG}\ \top\sigma <_{\perp\omega} \text{BEG}\ \perp\sigma]$; $^\top[p|\ p = \perp\omega||])^\top$; …

… fine-er-tv-*rem*-DEC$_\text{tv}$-1s.3s$_{(\perp\omega)}$

…$([s|\ \top\omega \angle_{des_{\top\omega}s} \perp\omega]$; $[\top\Omega = \perp\omega||]$; $[\text{CTR}\ \perp\sigma =_i \text{CTR}\top\varepsilon]$; $[\perp\omega, \top\omega \in$

$\perp\omega_2||]$; $[\top\omega \notin \text{MAX}\{\perp\omega_2||, des_{\top\omega}\ \top\varepsilon\}])$; $[\top\tau \subset_i \vartheta_{\top\omega}\perp\sigma, \text{BEG}\ \perp\sigma <_{\top\omega}$

$\top\varepsilon]$; $^\top[p|\ p = \top\omega||]$

(57iii)(53iii) Then when I die, he would've been there for my wife.

then   (-DEC$_\text{tv}$)   die-HYP$_\top$-1S …

$[v|\ v =_i \perp\omega]^\perp$; $((^P[spk_{\top\omega}\langle\top\varepsilon, \text{CTR}\top\varepsilon\rangle]$; $([e|\ die_{\perp\omega}\langle e, \text{CTR}\top\varepsilon\rangle, \top\varepsilon <_{\perp\omega} e]$;

$^\top[p|\ p = \perp\omega||])^\top$; …

… that-ERG$^\top$ wife-1S.$^\perp$ be.with-exp$^>$+*rem*-DEC$_\text{tv}$-3S$_{(\top)}$.3S$_{(\perp)}$

… $(^\top[x|\ x =_i \text{BCK}\perp\sigma_2]$; $[y|\ wife_{\top\omega}\langle y, \text{CTR}\top\varepsilon, \top\tau\rangle]$; $[s|\ be.with_{\perp\omega}\langle s, \top\delta,$

$\perp\delta\rangle]$; $[\perp\omega, \top\omega \in \perp\omega_3||]$; $[\perp\omega \notin \text{MAX}\{\perp\omega_3||, bel_{\top\omega}\top\varepsilon\}]$; $[\text{BEG}\perp\sigma \subset_{\perp\omega}$

$\text{CON}\perp\varepsilon]$; $[s|\ \text{BEG}\perp\sigma <_{\perp\omega} \text{END}\ s]$; $[\text{MAX}\langle\top\Omega, exp_{\top\omega} \perp\sigma\rangle \subseteq \perp\omega||_{\perp\sigma}]))$;

$[\top\tau \subset_i \vartheta_{\top\omega}\perp\sigma, \text{BEG}\ \perp\sigma <_{\top\omega} \top\varepsilon]$; $^\top[p|\ p = \top\omega||])$

The follow-up counterfactual (57ii) makes this explicit. The input modal base is the aforementioned domain where the speaker (of $\top\varepsilon$) has a wife (current $\perp\omega_2||$). The topical hypothesis is the sub-domain where the wished-for ($\perp\sigma_2$-)kid is a son, born (BEG $\perp\sigma$) after the marriage ceremony (BEG $\top\sigma$). This topical sub-domain is remote from the wife-only sub-domain the speaker believes he inhabits. The main attitudinal comment is that the speaker's ($\top\varepsilon$-)current wishes in the speech world ($\top\omega$) rank any world ($\perp\omega$) in this remote topical sub-domain ($\top\Omega$), where he also has a son, above the speech reality ($\top\omega$), where he only has a wife.

In the subordinated counterfactual (57iii) the modal anaphor 'then' zooms in on the wished-for worlds ($\perp\omega$) and requires the rest of the conditional to elaborate ($^\perp$;). The antecedent clause introduces the event of the speaker's death in the wished-for worlds, and the set of surviving worlds as the topical sub-domain. Since all men are mortal all worlds survive (so this 'HYP' translates into *when*, not *if*). The main attitudinal comment refers to this topical sub-domain ($\top\Omega$). It projects an expected consequence of the speaker's death in the wished-for topical sub-domain, which alas he does not

believe he inhabits. In the expected worlds of this remote sub-domain, after the speaker's death the son he wishes he had helps the wife he actually has.

The counterfactual Kennedy discourse (54i, ii) likewise projects an expected consequence in a modality the speaker does not believe to be his, but here viewed from a past perspective point. Temporal reference is analyzed in (58i, ii), building on the analysis of modal reference in (56i, ii).

(58i) (54i) Kennedy was assassinated because he had many enemies.

Kennedy-$^\top$ kill-pssv-DEC$_{iv}$-3S$_{(\top)}$ enemy-many-have-FCT$_\top$-3S$_\top$

$^\top[x|\ x =_i jfk]$; $^P[spk_{\top\omega}\langle\top\varepsilon,\ \text{CTR}\ \top\varepsilon\rangle]$; $[e|\ kill_{\top\omega}\langle e,\ \text{CTR}\ e,\ \top\delta\rangle,\ \top\tau \subset_i$ $\vartheta_{\top\omega}\ \text{CON}\ e,\ e <_{\top\omega} \top\varepsilon]$; $^\top[p|\ p = \top\omega\|]$; $[t|\ t =_i \vartheta_{\top\omega} \bot\varepsilon]$; $[s\ v|\ \text{CTR}\ s =_i \top\delta,$ $many.enemies_v\langle\text{BCK}\ s, \top\delta,\ \vartheta_v\ s\rangle,\ \bot\tau \subset_i \vartheta_v\ \text{CON}\ \text{BEG}\ s]$; $[\top\omega\| \subseteq \bot\omega\|]$

(58ii) (54ii) If Oswald hadn't killed him, someone else would've.

(-DEC)   Oswald-ERG$^\bot$ kill-prf-not-rem-HYP$_\bot$-3S$_\bot$-3S$^\bot$...

$^P[spk_{\top\omega}\langle\top\varepsilon,\ \text{CTR}\ \top\varepsilon\rangle]$; $(([y|\ y =_i osw];\ [e\ v|\ kill_v\langle e, \bot\delta,\ \top\delta\rangle];\ [s|\ s =_i$ $\text{CON}\ \bot\varepsilon,\ \top\tau \subset_i \vartheta_v\ s];\ [v|\ v \notin \bot\omega\|_{\top\tau}];\ [s|\ \text{CTR}\ s =_i \bot\delta,\ \top\tau \subset_i \vartheta_{\bot\omega}\ s]$;

$[\bot\omega, \top\omega \in \bot\omega_3\|]$; $[\bot\omega \notin \text{MAX}\{\bot\omega_3\|,\ bel_{\top\omega}\top\varepsilon\}]$; $[\text{BEG}\bot\sigma_3 <_{\bot\omega} \text{BEG}\bot\sigma$

$]$; $[\bot\omega \in \bot\omega_3\|]$; $^\top[p|\ p = \bot\omega\|])\ ^\top$; $([y|\ y =_i \top\delta];\ ...$

...man-bad-other-3S$_\bot$-ERG$^\top$ kill-prf-exp$^>$+rem-DEC$_{tv}$-3S$_{(\top)}$-3S$_{(\bot)}$

$^\top[x|\ man_{\bot\omega}\langle x, \bot\tau\rangle];\ [bad\{\top\delta, \top\delta\|_{\bot\omega}, \bot\tau\}];\ [\bot\delta_2 \in \top\delta\|];\ [\top\delta \neq_i \bot\delta_2]$

; $[e|\ kill_{\bot\omega}\langle e,\ \top\delta,\ \bot\delta\rangle];\ [s|\ s =_i \text{CON}\ \bot\varepsilon];\ [\bot\omega,\ \top\omega \in \bot\omega_3\|];\ [\bot\omega \notin$

$\text{MAX}\{\bot\omega_3\|,\ bel_{\top\omega}\top\varepsilon\}];\ [\text{BEG}\ \bot\sigma \subset_{\bot\omega} \text{CON}\ \text{BEG}\ \bot\sigma_4];\ [s|\ \text{BEG}\ \bot\sigma <_{\bot\omega}$

$\text{END}\ s];\ [\text{MAX}\langle\top\Omega, exp_{\top\omega}\bot\sigma\rangle \subseteq \bot\omega\|_{\bot\sigma}]));\ [\top\tau \subset_i \vartheta_{\top\omega}\bot\sigma,\ \text{BEG}\bot\sigma <_{\top\omega}$

$\top\varepsilon];\ ^\top[p|\ p = \top\omega\|]$

In (58i) the declarative clause outputs a common ground ($\top\omega\|$) where JFK's assassination is a ($\top\varepsilon$-)verifiable fact (as in (56i)). The post-posed factual clause adds another verifiable fact as a possible cause—to wit, JFK's enemies reaching critical mass (BEG s). The resulting ticking bomb state is realized in a larger class of worlds ($\bot\omega\|$), and in every common ground world ($\top\omega$) the time ($\bot\tau$) of JFK's assassination ($\bot\varepsilon$) falls within the consequent time of the beginning of this explosive state ($\vartheta_{\bot\omega}$ CON BEG s).

In this context, the counterfactual (58ii) introduces a ($\top\omega$-)real and ($\top\varepsilon$-)current state of expectation. It projects an expected consequence of the aforementioned event of JFK's enemies reaching critical mass (current

$\textsc{beg}\bot\sigma_3$ in the antecedent, $\textsc{beg}\bot\sigma_4$ in the consequent). The modal base for this expectation is the aforementioned class of worlds where this causal event is realized (current $\bot\omega_3\|$). The topical hypothesis introduced by the hypothetical mood is the sub-domain—remote from the sub-domain the speaker believes to be his—where JFK is not assassinated by Oswald. The main attitudinal comment is that within this remote topical sub-domain ($\top\Omega$), the worlds that best fit the speaker's ($\top\omega$, $\top\varepsilon$)-current expectations are those where in the wake of JFK's enemies reaching critical mass ($\textsc{beg}\bot\sigma_4$) some other bad guy assassinates him.

In summary, counterfactual conditionals report attitudes to remote modalities (Stalnaker 1975, Stone 1997). They are double attitude reports because the relation of modal remoteness is itself attitudinal. More precisely, the topical antecedent hypothesis and/or the scope of the attitudinal comment are marked as remote (disjoint) from an attitudinal ideal (e.g. beliefs or desires) of a current center of empathy, looking from a secondary perspective point. This secondary attitude report elaborates the main attitudinal comment about the topical antecedent hypothesis.

6 A CCG+UC FRAGMENT OF KALAALLISUT

We now show that the proposed UC representations can be derived from Kalaallisut discourse by universal directly compositional rules. Toward this end we define a fragment of Kalaallisut—rich enough to derive the counterfactual JFK discourse (54i, ii) and its UC representation (58i, ii)—in a framework that combines the universal rules of Combinatory Categorial Grammar (CCG, Steedman 2000) with UC as the translation language.

In CCG universal combinatory rules, such as forward- and backward-looking varieties of application ($>$, $<$) and composition ($>\mathbf{B}$, $<\mathbf{B}$, $\ll\mathbf{B}$), operate on language-specific lexical entries.

- $X/Y: B_{bc}$ $Y: A_{ab}$ $\Rightarrow_>$ $X: BA$
  $Y: A_a$ $X\backslash Y: B_{ab}$ $\Rightarrow_<$ $X: BA$
- $X/Y: B_{bc}$ $Y/Z: A_{ab}$ $\Rightarrow_{>\mathbf{B}}$ $X/Z: \lambda u_a.\, B(Au)$
  $Y\backslash Z: A_{ab}$ $X\backslash Y: B_{bc}$ $\Rightarrow_{<\mathbf{B}}$ $X\backslash Z: \lambda u_a.\, B(Au)$
  $Y\backslash Z\backslash Z': A_{aa'b}$ $X\backslash Y: B_{bc}$ $\Rightarrow_{\ll\mathbf{B}}$ $X\backslash Z\backslash Z': \lambda u_a \lambda u'_{a'}.\, B(Auu')$

The category s (sentence) is universal, but languages may disagree on other categories and the category-to-type rule. For Kalaallisut, I propose an inventory of categories defined in K1 on the basis of the universal category sentence (s) plus three types of pronouns: individual (pn_δ), modal (pn_ω), and

temporal (pn_τ). The category-to-type rule K2 requires sentences to translate into UC updates (type $[] := (st)st$) and *a*-pronouns into *a*-projections (type sa). Following standard practice, $[A_1 \ldots A_n]$ abbreviates $(A_1 \ldots (A_n[]))$.

K1 (Kalaallisut categories)
- s and pn_δ, pn_τ, pn_ω, are Kalaallisut categories
- If X and Y are Kalaallisut categories, then so are (X/Y) and $(X\backslash Y)$.

K2 (Kalaallisut category-to-type rule)
- **tp**(s) = [], **tp**(pn_a) = sa
- **tp**(X/Y) = **tp**($X\backslash Y$) = (**tp**(Y) **tp**(X))

ABBREVIATIONS (categories and types)

$\underline{s}$:= $s\backslash pn_\omega$	s_a := $s\backslash pn_a$	pn := pn_δ	D := $s\delta$	W = $s\omega$
iv := $\underline{s}\backslash pn_\delta$	cn_a := $(s_a\backslash pn_\omega)\backslash pn_\tau$	cn := cn_δ	T := $s\tau$	[] = $(st)st$

Kalaallisut has four categories of roots: *intransitive verbs* (iv), *transitive verbs* (iv\pn), *common nouns* (cn_a), and *relational nouns* (cn_a\pn). Transitive verbs and relational nouns have one extra argument (object $\underline{y}_D$ or possessor $\underline{z}_D$), so they require one extra bound pronoun (pn).

die-	$\vdash$	iv: $\lambda \underline{x}_D \lambda \underline{w}_W([e]; [die_w\langle \perp \varepsilon, \underline{x}\rangle])$
kill-	$\vdash$	iv\pn: $\lambda \underline{y}_D \lambda \underline{x}_D \lambda \underline{w}_W([e]; [kill_w\langle \perp \varepsilon, \underline{x}, \underline{y}\rangle])$
JFK-	$\vdash$	cn: $\lambda \underline{t}_T \lambda \underline{w}_W \lambda \underline{x}_D[\underline{x} =_i jfk]$
man-	$\vdash$	cn: $\lambda \underline{t}_T \lambda \underline{w}_W \lambda \underline{x}_D[man_w\langle \underline{x}, \underline{t}\rangle]$
enemy-	$\vdash$	cn\pn: $\lambda \underline{z}_D \lambda \underline{t}_T \lambda \underline{w}_W \lambda \underline{x}_D[enemy_w\langle \underline{x}, \underline{z}, \underline{t}\rangle]$

Verbal roots inflect for mood and a bound subject pronoun ($\underline{x}_D$). Semantically, they introduce eventualities into discourse. Nominal roots inflect for number (SG is unmarked) and case. Unlike verbs, they have a temporal argument ($\underline{t}_\tau$), which can be saturated by derivation (e.g. '-have') or case inflection. The primary (last) argument of a verbal root is the world of evaluation ($\underline{w}_W$). Nominal roots have primary arguments of various types: an individual for $cn_{(\delta)}$ (e.g. *inuk*- 'man'), a time for cn_τ (e.g. *ulluq*- 'day'), or a world for cn_ω (e.g. *isuma*- 'idea'). This interacts with lexical accommodation, which can only accommodate primary arguments (see -$^\top(\cdot)$, -$^\perp(\cdot)$ below).

Kalaallisut is a massively polysynthetic language, with hundreds of derivational suffixes. Complex bases are compositional, transparent to discourse anaphora, and always allow further derivation (cf. English syntactic phrases). All derivational suffixes operate within the space of root

categories. That is, a derivational suffix attaches to an input base of a root category and derives an output base of the same or another root category.

-bad |–   cn\cn: $\lambda\underline{N}_{[\mathrm{TWD}]}\lambda\underline{t}_\mathrm{T}\lambda\underline{w}_\mathrm{W}\lambda\underline{x}_\mathrm{D}.\ \underline{N}\ \underline{t}\ \underline{w}\ \underline{x};\ [bad\{\underline{x}, \underline{x}\|_{\underline{w}}, \underline{t}\}]$

-other |–   (cn\pn)\cn: $\lambda\underline{N}_{[\mathrm{TWD}]}\lambda\underline{z}_\mathrm{D}\lambda\underline{t}_\mathrm{T}\lambda\underline{w}_\mathrm{W}\lambda\underline{x}_\mathrm{D}.\ \underline{N}\ \underline{t}\ \underline{w}\ \underline{x};\ [\underline{z} \in \underline{x}\|];\ [\underline{x} \neq_i \underline{z}]$

-have |–   iv\(cn\pn): $\lambda\underline{M}_{[\mathrm{DTWD}]}\lambda\underline{x}_\mathrm{D}\lambda\underline{w}_\mathrm{W}.[s|\ \mathrm{CTR}\ s =_i \underline{x}]\ \perp;\ \underline{M}\ \underline{x}\ (\vartheta_{\underline{w}} \perp \sigma)\ \underline{w}$
                  $(\mathrm{BCK} \perp \sigma)$

-pssv |–   iv\(iv\pn): $\lambda\underline{R}_{[\mathrm{DDW}]}\lambda\underline{x}_\mathrm{D}\lambda\underline{w}_\mathrm{W}.\ \underline{R}\ \underline{x}\ (\mathrm{CTR} \perp a)°\ \underline{w}$

-prf |–   iv\iv: $\lambda\underline{P}_{[\mathrm{DW}]}\lambda\underline{x}_\mathrm{D}\lambda\underline{w}_\mathrm{W}.\ \underline{P}\ \underline{x}\ \underline{w}\ \perp;\ [s|\ s =_i \mathrm{CON}\ \mathrm{EVT} \perp a]$

-exp$^>$ |– $\underline{s}$\$\underline{s}$: $\lambda\underline{V}_{[\mathrm{W}]}\lambda\underline{w}_\mathrm{W}.\ (\underline{V} \perp \omega\ \perp;\ [\mathrm{EVT} \perp a \subset_{\perp\omega} \mathrm{CON}\ ?\varepsilon]);\ [s|\ \mathrm{EVT} \perp a <_{\perp\omega}$
                  $\mathrm{END}\ s];\ [\mathrm{MAX}\langle\top\Omega, exp_{\underline{w}} \perp\sigma\rangle \subseteq \perp\omega\|_{\perp\sigma}]$

-not |– $\underline{s}$\$\underline{s}$: $\lambda\underline{V}_{[\mathrm{W}]}\lambda\underline{w}_\mathrm{W}.(\underline{V} \perp \omega\ \perp;\ [\mathrm{AT}_{\perp\omega}\{\mathrm{STA} \perp a, ?\tau\}]);\ ([v]\ \perp;\ [\underline{w} \notin \perp\omega_2\|_{?\tau}$
                  $];\ [s|\ \mathrm{CTR}\ s =_i \mathrm{CTR} \perp a];\ [\mathrm{AT}_{\underline{w}}\{\perp\sigma, ?\tau\}])$

-rem |– $\underline{s}$\$\underline{s}$: $\lambda\underline{V}_{[\mathrm{W}]}\lambda\underline{w}_\mathrm{W}.\underline{V} \perp \omega;\ [\perp\omega, \top\omega \in ?\omega\|];\ [\underline{w} \notin \mathrm{MAX}\{?\omega\|, att_{\top\omega}\ ?\varepsilon\}]$

+rem |– $\underline{s}$\$\underline{s}$\($\underline{s}$\$\underline{s}$): $\lambda\underline{F}_{[[\mathrm{W}]\mathrm{W}]}\lambda\underline{V}_{[\mathrm{W}]}\lambda\underline{v}_\mathrm{W}.\ \underline{F}\ \lambda\underline{w}_\mathrm{W}(\underline{V} \perp \omega;\ [\perp\omega, \top\omega \in ?\omega\|];\ [\underline{w} \notin$
                  $\mathrm{MAX}\{?\omega\|, att_{\top\omega}\ ?\varepsilon\}])\ \underline{v}$

   Kalaallisut RPT-suffixes interact with negative ($\notin$)-suffixes in a way similar to English *neg*-raising. I attribute this to additional *neg*-raising entries for negative suffixes (e.g. '+rem'), which enable them to form complex predicates with RPT-suffixes (e.g. '-exp$^>$+rem'), in effect reversing the relative scope within the complex.

   Verbal bases inflect for mood. The output is not a root category, so it can only feed into further inflection. Matrix moods have an illocutionary presupposition relating the speech act to the topic world ($^\mathrm{P}[\ldots]$). In addition, fact-oriented declarative mood (-DEC) asserts that the iv-event (EVT $\perp a$) is a speech act verifiable fact and introduces the set of surviving speech worlds ($\top\omega\|$) as a topical proposition (truth-set of the declarative statement). The dependent fact-oriented mood (-FCT) introduces a background fact ($\perp b$) that is realized throughout the matrix common ground and may have caused the matrix event ($\perp a$). The prospect-oriented hypothetical mood (-HYP) forms a modal topic-comment sequence ($^\mathrm{T};$) with the verbal base of the matrix ($\underline{s}$). The modal topic is the sub-domain of the modal base ($?\omega\|$) where the antecedent prospect, viewed from a salient perspective point ($?\varepsilon$), is realized.

-DEC $\vdash$ s\pn\iv: $\lambda \underline{P}_{[DW]} \lambda \underline{x}_D.^P[spk_{\top\omega}\langle \top\varepsilon, \text{CTR } \top\varepsilon\rangle]; (\underline{P}\,\underline{x}\; \top\omega\;^\perp; [\text{AT}_{\top\omega}\{\perp a,$

          $\top\tau\}]); [\text{EVT } \perp a <_{\top\omega} \top\varepsilon];\;^\top[p|\,p = \top\omega\|]$

-FCT $\vdash$ (s\s)\pn\iv: $\lambda \underline{P}_{[DW]} \lambda \underline{x}_D \lambda K_{[]}.((K\;^\perp; [t|\,t =_i \vartheta_{\top\omega} \text{ EVT } \perp a])\;^\perp; (\underline{P}\,\underline{x}\; \perp\omega$

          $^\perp; [\perp\tau \subset_i \vartheta_{\perp\omega} \text{ CON EVT } \perp b])); [\top\omega\| \subseteq \perp\omega\|]$

-HYP $\vdash$ (s/s)\pn\iv: $\lambda \underline{P}_{[DW]} \lambda \underline{x}_D \lambda \underline{V}_{[W]} \lambda \underline{w}_W.((\underline{P}\,\underline{x}\; \perp\omega\;^\perp; [?\varepsilon <_{\perp\omega} \text{ EVT } \perp a]);$

          $[\perp\omega \in ?\omega\|];\;^\top[p|\,p = \perp\omega\|])\;^\top; \underline{V}\,\underline{w}$

The mood inflection is followed by bound pronouns (category x\(x\pn), with x $\in$ {s, s\s, s/s, s/s, s\s} for subject pronouns). That is why an inflected matrix verb in Kalaallisut is a complete sentence (see Jelinek 1984 on pronominal argument languages). Possessor arguments of relational nouns are likewise saturated by bound pronouns. Third person pronouns are either topical (e.g. -*ni* '3S$_\top$') or backgrounded (e.g. -*a* '3S$_\perp$'). Typically, they are interpreted as topic or background anaphors that saturate the current argument slot. Alternatively, they may update the centering status of that argument (e.g. in the antecedent of (54ii), -*gu* '3S$_\perp$' fills the object slot with the input topic, JFK, and demotes JFK to output background.)

-3S$_\top$ $\vdash$ x\(x\pn): $\lambda \underline{X}_{[D...]}. \underline{X}\; \top\delta$

-3S$_{\perp(2)}$ $\vdash$ x\(x\pn): $\lambda \underline{X}_{[D...]}. \underline{X}\; \perp\delta_{(2)}$

-3S$_\perp$ $\vdash$ (s/s)\((s/s)\pn): $\lambda \underline{G}_{[D[W]W]} \lambda \underline{V}_{[W]}. \underline{G}\; \top\delta\; \lambda \underline{w}_W([y|\,y =_i \top\delta]\;^\perp; \underline{V}\,\underline{w})$

Nominal bases inflect for case. The direct cases (unmarked absolutive and marked ergative) form sentence (s-)modifiers. These pseudo 'subjects' and 'objects' set the topic or background for an anaphoric bound pronoun, which is the true argument of the predicate in the modified sentence.

-(ERG)$^\top$ $\vdash$ (s/s)\cn: $\lambda \underline{N}_{[TWD]} \lambda K_{[]}. \underline{N}\; ?\tau\; ?\omega\; \top\delta\;^\top; K$

-(ERG)$^\perp$ $\vdash$ (s/s)\cn: $\lambda \underline{N}_{[TWD]} \lambda K_{[]}. \underline{N}\; ?\tau\; ?\omega\; \perp\delta\;^\perp; K$

Kalaallisut is topic-prominent and polysynthetic. I attribute these typological traits partly to basic lexical entries, such as the above, and partly to lexical accommodation (-$^\top$($\cdot$), -$^\perp$($\cdot$)) and type lifting (-($\cdot$)$^+$, -$^+$($\cdot$)). Type lifting by -($\cdot$)$^+$ turns sentence modifiers (s/s) into verbal base modifiers (s/s), whereas -$^+$($\cdot$) makes verbal bases (s) accessible to word-external modifiers.

-$^\top$($\cdot$) $\vdash$ s$_a$\s$_a$: $\lambda P_{[sa]} \lambda \underline{u}_{sa}.\;^\top[u_a]\;^\top; P\,\underline{u}$ ($a \in \text{DR}(\Theta)$)

-$^\perp$($\cdot$) $\vdash$ s$_a$\s$_a$: $\lambda P_{[sa]} \lambda \underline{u}_{sa}. [u_a]\;^\perp; P\,\underline{u}$

$-(\cdot)^+$ $\vdash$ $(\underline{s}/\underline{s})\backslash(s/s)$: $\lambda \underline{K}_{[[]]}\lambda \underline{V}_{[W]}\lambda \underline{w}_W.\ \underline{K}\ (\underline{V}\ \underline{w})$

$-^+(\cdot)$ $\vdash$ $(iv\backslash(\underline{s}/\underline{s}))\backslash iv$: $\lambda \underline{P}_{[DW]}\lambda \underline{F}_{[[W]W]}\lambda \underline{x}_D\lambda \underline{w}_W.\ \underline{F}\ (\underline{P}\ \underline{x})\ \underline{w}$

In this fragment the counterfactual JFK discourse (54i, ii) is derived as follows. Complex words are incrementally built and translated into UC by universal rules of backward application and composition (<, <**B**, and ≪**B**). For example, sentence (54i) consists of three words, which are built in (59a) and (60a); the resulting UC translations (b) are equivalent to (c). Words are then combined, incrementally left-to-right, into sentences. For discourse (54i, ii) the two component sentences are built in (59)–(61) and (62)–(68). In general, a Kalaallisut sentence consists of a saturated matrix verb (category s or type-lifted s\(s/s)) plus any number of dependent modifiers (s/s, s/s, s\s). Most dependents precede the matrix verb, but one or two may be post-posed (like s\s (60) in (61)). Multiple dependents on the same side of the matrix verb compose (by >**B** or <**B**) into a dependent cluster (as in (66)), which then combines with the matrix verb like a single dependent (by > or <).

(59) a. | Kennedy- | $-^T(\cdot)$ | $-^T$ | kill- | -pssv- | -DEC$_{iv}$ | -3S$_{(T)}$ |

b. $(^T[x_\delta]\ ^T;\ [\top \delta =_i jfk])\ ^T;\ (^P[spk_{\top\omega}\langle \top\varepsilon,\ \text{CTR}\top\varepsilon\rangle]);\ (([e];\ [kill_{\top\omega}\langle \bot\varepsilon,\ \text{CTR}$
    $\bot\varepsilon,\ \top\delta\rangle])\ ^\bot;\ [\text{AT}_{\top\omega}\{\text{EVT}\bot\varepsilon,\ \top\tau\}]);\ [\text{EVT}\bot\varepsilon <_{\top\omega}\top\varepsilon];\ ^T[p|\ p = \top\omega||])$

c. $^T[x|\ x =_i jfk];\ ^P[spk_{\top\omega}\langle \top\varepsilon,\ \text{CTR}\ \top\varepsilon\rangle];\ [e|\ kill_{\top\omega}\langle e,\ \text{CTR}\ e,\ \top\delta\rangle,\ \top\tau \subset_i$
    $\vartheta_{\top\omega}\ \text{CON}\ e,\ e <_{\top\omega}\top\varepsilon];\ ^T[p|\ p = \top\omega||]$ $\equiv$ (59b)

(60) a.

enemy-	-many	-have	$-^{\perp}(\cdot)$	-FCT$_\top$	-3s$_\top$
cn\pn	cn\cn	iv\(cn\pn)	$s_\omega\backslash s_\omega$	(s\s)\pn\iv	x\(x\pn)

$$\underline{\text{cn\textbackslash pn}} \quad <\mathbf{B}$$

iv (= s_ω\pn)

$$\underline{\hspace{4cm}} \quad <$$

iv

$$\underline{\hspace{5cm}} \quad <\mathbf{B}$$

(s\s)\pn

$$\underline{\hspace{6.5cm}} \quad <$$

s\s

b. $\lambda K_{[]}.\ ((K^{\perp};\ [t|\ t =_i \vartheta_{\top\omega}\ \text{EVT}\ \perp\varepsilon])^{\perp};\ (([v_\omega]^{\perp};\ ([s|\ \text{CTR}\ s =_i \top\delta]^{\perp};$
$many.enemies_{\perp\omega}\langle \text{BCK}\ \perp\sigma,\ \top\delta,\ \vartheta_{\perp\omega}\ \perp\sigma\rangle]))^{\perp};\ [\perp\tau \subset_i \vartheta_{\perp\omega}\ \text{CON}$
$\text{EVT}\ \perp\sigma]));\ [\top\omega\| \subseteq \perp\omega\|]]$

c. $\lambda K_{[]}.\ (K^{\perp};\ [t|\ t =_i \vartheta_{\top\omega}\ \perp\varepsilon]);\ [s\ v|\ \text{CTR}\ s =_i \top\delta,\ many.enemies_v\langle \text{BCK}\ s,$
$\top\delta,\ \vartheta_v\ s\rangle,\ \perp\tau \subset_i \vartheta_v\ \text{CON}\ \text{BEG}\ s];\ [\top\omega\| \subseteq \perp\omega\|]]$ $\equiv$ (60b)

(61) (59) (60) $\Rightarrow_<$ s: equivalent of (58i)

(62) $(^{\perp}(\text{Oswald})\text{-ERG}^{\perp})^+\ \vdash\ \underline{s/s}:\ \lambda \underline{V}_{[\text{w}]}\lambda \underline{w}_\text{w}.\ [y|\ y =_i osw]^{\perp};\ \underline{V}\ \underline{w}$

(63) $^+(^{\perp}\text{kill})\text{-prf-not-rem-HYP}_{\perp}\text{-3s}_{\perp}\text{-3s}^{\perp}\ \vdash\ (\underline{s/s})\backslash(\underline{s/s}):\ \lambda \underline{F}_{[[\text{w}]\text{w}]}\lambda \underline{V}_{[\text{w}]}\lambda \underline{w}_\text{w}.\ (((\underline{F}$
$\lambda \underline{v}_\text{w}([v_\omega]^{\perp};\ [e|\ kill_v\langle e,\ \perp\delta,\top\delta\rangle])\perp\omega);\ [s|\ s =_i \text{CON}\perp\varepsilon,\ \top\tau \subset_{\perp\omega} s];\ [v|\ v$
$\notin \perp\omega\|_{\top\tau}];\ [s|\ \text{CTR}\ s =_i \perp\delta,\ \top\tau \subset_{\perp\omega} s];\ [\perp\omega,\ \top\omega \in \perp\omega_3\|];\ [\perp\omega \notin$
$\text{MAX}\{\perp\omega_3\|,\ bel_{\top\omega}\ \top\varepsilon\}];\ [\text{BEG}\ \perp\sigma_3 <_{\perp\omega} \text{BEG}\ \perp\sigma];\ [\perp\omega \in \perp\omega\|];$
$^\top[p|\ p = \perp\omega\|])^\top;\ ([y|\ y = \top\delta]^{\perp};\ \underline{V}\ \underline{w}))$

(64) (62) (63) $\Rightarrow_<$ $\underline{s/s}:\ \lambda \underline{V}_{[\text{w}]}\lambda \underline{w}_\text{w}.\ ([y|\ y =_i osw];\ [s\ e\ v|\ kill_v\langle e,\ \perp\delta,\ \top\delta\rangle,\ s =_i$
$\text{CON}\ e,\ \top\tau \subset_i \vartheta_v\ s];\ [v|\ v \notin \perp\omega\|_{\top\tau}];\ [s|\ \text{CTR}\ s =_i \perp\delta,\ \top\tau \subset_{\perp\omega} s];\ [\perp\omega,$
$\top\omega \in \perp\omega_3\|];\ [\perp\omega \notin \text{MAX}\{\perp\omega_3\|,\ bel_{\top\omega}\ \top\varepsilon\}];\ [\text{BEG}\ \perp\sigma_3 <_{\perp\omega} \text{BEG}\ \perp\sigma];$
$^\top[p|\ p = \perp\omega\|])^\top;\ ([y|\ y = \top\delta]^{\perp};\ \underline{V}\ \underline{w})$

(65) $(^\top(\text{man-bad-other-3s}_{\perp 2})\text{-ERG}^\top)^+\ \vdash\ \underline{s/s}:\ \lambda \underline{V}_{[\text{w}]}\lambda \underline{w}_\text{w}.\ ((^\top[x|\ man_{\perp\omega}\langle x,\ \perp\tau\rangle];$
$[bad\{\top\delta,\ \top\delta\|_{\perp\omega},\ \perp\tau\}];\ [\perp\delta_2 \in \top\delta\|];\ [\top\delta \neq_i \perp\delta_2])^\top;\ \underline{V}\ \underline{w})$

(66) (64) (65) $\Rightarrow_{>\mathbf{B}}$ $\underline{s}/\underline{s}$: $\lambda \underline{V}_{[\text{w}]} \lambda \underline{w}_{\text{w}}$. $([y|\, y =_i osw]$; $[s\, e\, v|\, kill_v \langle e, \bot \delta, \top \delta \rangle, s =_i$ CON $e, \top \tau \subset_i \vartheta_v\, s]$; $[v|\, v \notin \bot \omega \|_{\top \tau}]$; $[s|\, \text{CTR}\, s =_i \bot \delta, \top \tau \subset \vartheta_{\bot \omega}\, s]$; $[\bot \omega,$ $\top \omega \in \bot \omega_3\|]$; $[\bot \omega \notin \text{MAX}\{\bot \omega_3\|, bel_{\top \omega} \top \varepsilon\}]$; $[\text{BEG}\, \bot \sigma_3 <_{\bot \omega} \text{BEG}\, \bot \sigma]$; $^\top[p|\, p = \bot \omega\|])\, ^\top$; $([y|\, y =_i \top \delta]\, ^\bot$; $((^\top[x|\, man_{\bot \omega} \langle x, \bot \tau \rangle]$; $[bad\{\top \delta, \top \delta \|_{\bot \omega},$ $\bot \tau\}]$; $[\bot \delta_2 \in \top \delta\|]$; $[\top \delta \neq_i \bot \delta_2])\, ^\top$; $\underline{V}\, \underline{w}))$

(67) $^+$(kill-prf-exp$^>$+rem)-DEC$_{iv}$-3s$_{(\top)}$-3s$_{(\bot)}$ $\vdash$ $\underline{s} \backslash (\underline{s}/\underline{s})$: $\lambda \underline{F}_{[[\text{w}]\text{w}]}$.$((\underline{F}\, \lambda \underline{w}_{\text{w}}([s\, e|$ $kill_{\bot \omega} \langle e, \top \delta, \bot \delta \rangle, s =_i$ CON $e]$; $[\bot \omega, \top \omega \in \bot \omega_3\|]$; $[\bot \omega \notin \text{MAX}\{\bot \omega_3\|,$ $bel_{\top \omega} \top \varepsilon\}]$; $[\text{BEG}\, \bot \sigma \subset_{\bot \omega} \text{CON BEG}\, \bot \sigma_4]$; $[s|\, \text{BEG}\, \bot \sigma <_{\bot \omega} \text{END}\, s]$; $[\text{MAX} \langle \top \Omega, exp_w \bot \sigma \rangle \subseteq \bot \omega \|_{\bot \sigma}])\, \top \omega)$; $[\top \tau \subset_i \vartheta_{\top \omega} \bot \sigma, \text{BEG} \bot \sigma <_{\top \omega} \top \varepsilon]$; $^\top[p|\, p = \top \omega\|]$

(68) (66) (67) $\Rightarrow_<$ s: equivalent of (58ii)

This left-to-right incremental analysis correctly predicts one more typological trait of Kalaallisut—to wit, the 'free' order of the dependents of a matrix verb. It also extends to the other discourses in §1–5. Thus, the proposed UC representations can be derived from Kalaallisut discourse by universal directly compositional rules of CCG.

7 FROM KALAALLISUT TO ENGLISH

Typologically, Kalaallisut is a mood-based topic-prominent language with massively polysynthetic morphology and 'free' word order. At the other extreme, English is a tense-based subject-prominent language with analytic morphology and rigid word order. As a consequence, none of the Observations 1–6 about the syntax-semantics interface extend to English. Unlike Kalaallisut, English has no fact-oriented mood, no prospect-oriented hypothetical mood, no prospect-oriented attitudinal correlate requirement, and no translation equivalent for the remoteness suffix *-galuar* 'rem'.

Nevertheless, I propose that that in English too conditionals are a species of attitude reports. This proposal builds on the CCG+UC fragment of English presented in Bittner (*t.a.*). This fragment implements the standard theory of tense as temporal anaphora (Partee 1973, 1984) and temporal update (Webber 1988), and of indicative 'mood' as common ground update (Stalnaker 1975). It also accounts for the typological traits of English. As in Kalaallisut, universal CCG rules translate English discourses into UC. For

instance, the indicative discourse (69i, ii) translates into (a UC equivalent of) (70i, ii), given lexical entries such as the following sample:

leave- $\vdash$ $\underline{s}$: $\lambda\underline{w}_W.\ [e|\ leave_w\langle e, \text{CTR } e\rangle]$

-TNS$_\geq$ $\vdash$ iv\$\underline{s}$: $\lambda\underline{V}_{[W]}\lambda x_D\lambda\underline{w}_W.\ ^P[\vartheta_{\top\omega}\top\varepsilon \leq_i \top\tau];\ [w \in \top\omega\|];\ (\underline{V}\ \underline{w}\ ^\perp;\ [\text{AT}_{\underline{w}}\langle\perp a,$
$\top\tau\rangle, \text{CTR }\perp a =_i \underline{x}])$

FUT$_{viv}$ $\vdash$ iv/$\underline{s}_\emptyset$: $\lambda\underline{V}_{[W]}\lambda x_D\lambda\underline{w}_W.\ ^P[\vartheta_{\top\omega}\top\varepsilon <_i \top\tau];\ ^P[w \in \top\omega\|];\ (\underline{V}\ \underline{w}\ ^\perp;\ [\text{AT}_{\underline{w}}\langle\perp a,$
$\top\tau\rangle, \text{CTR }\perp a =_i \underline{x}])$

Jim $\vdash$ $\underline{s}$/iv: $\lambda\underline{P}_{[DW]}\lambda\underline{w}_W.\ ^\top[x|\ x =_i jim]\ ^\top;\ \underline{P}\ \top\delta\ w$

today$_a$ $\vdash$ iv\iv: $\lambda\underline{P}_{[DW]}\lambda x_D\lambda\underline{w}_W.\ \underline{P}\ x\ \underline{w}\ ^\perp;\ [\vartheta_{\underline{w}}\perp a \subseteq tod_{\top\omega}\top\varepsilon]$

$-(\cdot)^{\top\tau}$ $\vdash$ iv\iv: $\lambda\underline{P}_{[DW]}\lambda x_D\lambda\underline{w}_D.\ \underline{P}\ x\ \underline{w}\ ^\perp;\ ^\top[t|\ t \subseteq_i \vartheta_{\underline{w}}\text{ CON }\perp\varepsilon]$

$-^{\top\tau}(\cdot)$ $\vdash$ iv\iv: $\lambda\underline{P}_{[DW]}\lambda x_D\lambda\underline{w}_D.\ ^\top[t]\ ^\top;\ \underline{P}\ x\ w$

. $\vdash$ s\$\underline{s}$: $\lambda\underline{V}_{[W]}.\ \underline{V}\ \top\omega;\ ^\top[p|\ p = \top\omega\|]$

(69) i. *Jim leaves today.*
ii. *Sue will be upset.*

(70) i. *Jim* ($^{\top\tau}$(*leave*-TNS$_\geq$))$^{\top\tau}$ *today$_\varepsilon$* .
$^\top[x|\ x =_i jim];\ ^\top[t];\ ^P[\vartheta_{\top\omega}\top\varepsilon \leq_i \top\tau];[\top\omega \in \top\omega\|];\ [e|\ leave_{\top\omega}\langle e,\top\delta\rangle,$
$\vartheta_{\top\omega}\ e \subset_i \top\tau,\ \vartheta_{\top\omega}\ e \subseteq_i tod_{\top\omega}\top\varepsilon];\ ^\top[t|\ t \subseteq_i \vartheta_{\top\omega}\text{CON}\perp\varepsilon];\ ^\top[p|\ p = \top\omega\|]$
ii. *Sue* FUT$_{viv}$ *be-ø upset* .
$^\top[x|\ x =_i sue];\ ^P[\vartheta_{\top\omega}\top\varepsilon <_i \top\tau];\ ^P[\top\omega \in \top\omega\|];\ [s|\ upset_{\top\omega}\langle s, \top\delta\rangle,$
$\top\tau \subset_i \vartheta_{\top\omega}\ s];\ ^\top[p|\ p = \top\omega\|]$

In (70i) the topic world ($\top\omega$) is the local candidate for the speech world, by default (D7). Unlike Kalaallisut, which employs the global AT-update, [AT$_W\{A, T\}$], English employs the local AT-condition, AT$_W\langle A, T\rangle$. To satisfy this and the presupposition of the non-past tense, a topical future *period* must be accommodated (by $^{\top\tau}(\cdot)$) and the verbal event included within this period, since the speech *instant* ($\vartheta_{\top\omega}\top\varepsilon$) cannot properly include anything. In addition, tense on an event verb may shift the topic time to the consequent time (by $(\cdot)^{\top\tau}$), as in (70i). This temporal update does not affect post-verbal *today*, which constrains the eventuality, not the topic time. In English illocutionary force is in part marked by prosody. The full stop prosody ('.') turns a sentence radical ($\underline{s}$) into a declarative sentence (s) by predicating the radical of the topic world ($\top\omega$) and introducing the set of surviving topic worlds (new common ground) as a topical proposition. On this analysis, the indicative is not a fact-oriented mood, but a modal default.

The salient reading of (69ii) is explicated in (70ii). The vivid future auxiliary *will* presupposes a future topic time and a vivid world of evaluation, i.e., the evaluation world must be in the common ground ($\top \omega \|$, pace Stone 1997). In (70ii) both tests are passed, by the topical future following Jim's departure ($\top \tau$) and the topical speech world ($\top \omega$). In the speech worlds that survive the assertion of (70ii) Sue is sad at that topical future time. Thus, in root clauses *will* does not involve any modal quantification. All that matters is the actual future of the speech world (pace Kamp and Reyle 1993).

In contrast, in conditionals *will* quantifies over branching futures (pace Thomason 1984), because the complementizer *if* builds a modal topic-comment sequence. The antecedent of *will* introduces a topical set of vivid futures and *will*, as part of the comment, quantifies over this set. English *if* does not require any attitudinal correlate because it is itself implicitly attitudinal (cf. Kratzer 1981), unlike the hypothetical mood in Kalaallisut.

if $\vdash$ ($\underline{s}/\underline{s})/\underline{s}$: $\lambda \underline{V}_{[w]} \lambda \underline{V}'_{[w]} \lambda \underline{w}_{w}.((\underline{V} \bot \omega;\ {}^{\top}[p|\ p = \bot \omega \|])\ {}^{\top};\ (\underline{V}' \bot \omega;\ [\text{MAX}\langle \top \Omega$
$,\ att_{\underline{w}}\ ?\varepsilon \rangle\ \subseteq\ \bot \omega \|_{?\varepsilon}])))$

For example, the conditional variant of discourse (69i, ii) translates into (71). The non-past antecedent (*if Jim leaves*...) introduces a topical sub-domain, of the common ground ($\top \omega \|$, pace Stalnaker 1975), where Jim leaves at a future topic time (accommodated by $-^{\top \tau}(\cdot)$, as in (70i)). The topical future for the attitudinal comment is the consequent time of this event (introduced by $-(\cdot)^{\top \tau}$, as in (70i)). The attitudinal comment (...*Sue will be upset*) is analyzed as a prediction, i.e., the implicit attitude of *if* is resolved to expectation (*exp*) and the perspective point to the speech act ($\top \varepsilon$). In the antecedent worlds that best fit the speaker's expectations Sue is sad at that topical future time, i.e. in the wake of Jim's anticipated departure.

(71) $\bot$*if Jim* $({}^{\top \tau}(\textit{leave-}\text{TNS}_{\geq}))^{\top \tau}$ ...
　　　($[v]\ \bot$; $(({}^{\top}[x|\ x =_{i} jim];\ {}^{\top}[t];\ {}^{\text{P}}[\vartheta_{\top \omega} \top \varepsilon \leq_{i} \top \tau];[\bot \omega \in \top \omega \|];\ [e|\ \textit{leave}_{\bot \omega}\langle e,$
　　　$\top \delta \rangle,\ \vartheta_{\bot \omega}\ e \subset_{i} \top \tau];\ {}^{\top}[t|\ t \subseteq_{i} \vartheta_{\bot \omega}\ \text{CON}\ \bot \varepsilon];\ {}^{\top}[p|\ p = \bot \omega \|])\ {}^{\top};$ ...
　　　... *Sue* FUT$_{viv}$ *be-ø upset* (*if*) .
　　　... $({}^{\top}[x|\ x =_{i} sue];\ {}^{\text{P}}[\vartheta_{\top \omega}\ \top \varepsilon <_{i} \top \tau];\ {}^{\text{P}}[\bot \omega \in \top \omega \|];\ [s|\ \textit{upset}_{\bot \omega}\langle s, \top \delta \rangle,$
　　　$\top \tau \subset_{i} \vartheta_{\bot \omega}\ s];\ [\text{MAX}\langle \top \Omega, exp_{\top \omega} \top \varepsilon \rangle\ \subseteq\ \bot \omega \|_{\top \varepsilon}])));\ {}^{\top}[p|\ p = \top \omega \|]$

Unlike Kalaallisut, English marks remoteness from attitudinal ideals (e.g. from the most desirable worlds, in the context of (72i)) by a variety of

means, e.g. 'fake past' in the antecedent and a future-oriented remote modal in the matrix (as in (72ii), see Iatridou 2000, Condoravdi 2002).

(72) i. *I want Jim to win tomorrow.*
    ii. *If he lost, Sue {would | might} get upset.*

Iatridou (2000) shows that past tense marking is used in this way in unrelated languages all over the world, so it cannot be chance. She proposes that past tense can indicate either that 'the topic time excludes the utterance time' (p. 246) or that 'the topic worlds exclude the actual world' (p. 247). This proposal is both too weak (not now does not mean past) and too strong (undesirable does not mean not actual, alas), but the basic idea is attractive. Building on that I propose that past tense ($_<$TNS) presupposes *precedence*— either the topic time precedes the perspective time in the temporal order, or the world of evaluation precedes (ranks below) the perspective world in a salient attitudinal order. The latter reading may be forced by a future-oriented modal that likewise presupposes remoteness (e.g. FUT$_{rem}$ or MAY$_{rem}$).

$_<$TNS $\vdash$ iv\s: $\lambda \underline{V}_{[w]}\lambda x_D \lambda \underline{w}_w.\,^P[\top\tau <_i \vartheta_{\top\omega}\top\varepsilon]$; $[\underline{w}\in\top\omega\|]$; $(\underline{V}\,\underline{w}\perp$; $[\text{AT}_{\underline{w}}\langle\perp a,$
$\top\tau\rangle, \text{CTR}\perp a =_i \underline{x}])$

$\vdash$ iv\s: $\lambda \underline{V}_{[w]}\lambda x_D \lambda \underline{w}_w.\,^P[\underline{w} <_{att_{\top\omega}?\varepsilon} ?\omega]$; $[\underline{w}\in\top\omega\|]$; $(\underline{V}\,\underline{w}\perp$; $[\text{AT}_{\underline{w}}\langle\perp a,$
$?\tau\rangle, \text{CTR}\perp a =_i \underline{x}])$

FUT$_{rem}$ $\vdash$ iv/s$_\emptyset$: $\lambda \underline{V}_{[w]}\lambda x_D \lambda \underline{w}_w.\,^P[\vartheta_{\top\omega}?\varepsilon <_i ?\tau]$; $^P[\underline{w}\notin\text{MAX}\{\top\omega\|, att_{\top\omega}?\varepsilon\}]$; $(\underline{V}\,\underline{w}$
$\perp$; $[\text{AT}_{\underline{w}}\langle\perp a, ?\tau\rangle, \text{CTR}\perp a =_i \underline{x}])$

MAY$_{rem}$ $\vdash$ iv/s$_\emptyset$: $\lambda \underline{V}_{[w]}\lambda x_D \lambda \underline{w}_w.\,^P[\vartheta_{\top\omega}?\varepsilon <_i?\tau]$; $^P[\underline{w}\notin\text{MAX}\{\top\omega\|, att_{\top\omega}?\varepsilon\}]$; $((^\top[p|$
$p\subseteq\top\Omega]$; $[\underline{w}\in\top\Omega])\,^\top$; $(\underline{V}\,\underline{w}\perp$; $[\text{AT}_{\underline{w}}\langle\perp a, ?\tau\rangle, \text{CTR}\perp a =_i \underline{x}]))$

On this analysis of 'fake past' and future-oriented remote modals, discourse (72i, ii) translates into (a UC equivalent of) (73i, ii). After (73i) throughout the output common ground ($\top\omega\|$) the speaker (of $\top\varepsilon$) is in a ($\top\varepsilon$-)current state of desire in regard to the input common ground ($\top\Omega$). In the top-ranked ($\top\Omega$-)worlds Jim wins the following day ($\top\varepsilon$-tomorrow).

(73) i. *I want$_\perp$-TNS$_\geq$ Jim$^\perp$* INF *win-ø tomorrow$_\varepsilon$.*
    $^P[\vartheta_{\top\omega}\top\varepsilon \leq_i \top\tau]$;$[\top\omega\in\top\omega\|]$; $[y|\,y =_i jim]$; $[e\,v|\,win_v\langle e,\perp\delta\rangle, \vartheta_v\,e \subseteq_i$
    $tmr_{\top\omega}\top\varepsilon]$; $[s\,t|\,\vartheta_{\perp\omega}\perp\varepsilon \subset_i t, \vartheta_{\perp\omega}\text{ BEG }s <_i t]$; $[\text{MAX}\langle\top\Omega, des_{\top\omega}\perp\sigma\rangle$
    $\subseteq\perp\omega\|_{\perp}\sigma]$; $[\top\tau\subset_i \vartheta_{\top\omega}\perp\sigma, \text{CTR}\perp\sigma =_i \text{CTR}\top\varepsilon]$; $^\top[p|\,p =\top\omega\|]$

ii. $\perp$*if he* (*lose-$_{<}$*TNS)$^{\top\tau}$ …

([*v*] $\perp$; ($^{\text{P}}[\perp\omega <_{des_{\top\omega}\top\varepsilon} \perp\omega_2]$; $[\perp\omega \in \top\omega\|]$; [*e*| *lose*$_{\perp\omega}\langle e, \perp\delta\rangle$, $\vartheta_{\perp\omega} e$

$\subset_i \perp\tau$]; $^{\top}[t| t \subseteq_i \vartheta_{\perp\omega} \text{ CON } \perp\varepsilon]$; $^{\top}[p| p = \perp\omega\|]$) $^{\top}$; …

… *Sue* FUT$_{rem}$ *get-ø upset* (*if*) .

… ($^{\top}[x| x =_i sue]$; $^{\text{P}}[\vartheta_{\top\omega}\top\varepsilon <_i \top\tau]$; $^{\text{P}}[\perp\omega \notin \text{MAX}\{\top\omega\|, des_{\top\omega}\top\varepsilon\}]$;

[*e*| *upset*$_{\perp\omega}\langle$CON *e*, $\top\delta\rangle$, $\vartheta_{\perp\omega} e \subset_i \top\tau]$; [MAX$\langle\top\varOmega, exp_{\top\omega}\top\varepsilon\rangle \subseteq$

$\perp\omega\|_{\top\varepsilon}]$)); $^{\top}[p| p = \top\omega\|]$

… *Sue* MAY$_{rem}$ *get-ø upset* (*if*) .

… ($^{\top}[x| x =_i sue]$; $^{\text{P}}[\vartheta_{\top\omega}\top\varepsilon <_i \top\tau]$; $^{\text{P}}[\perp\omega \notin \text{MAX}\{\top\omega\|, des_{\top\omega}\top\varepsilon\}]$;

$^{\top}((([p| p \subseteq \top\varOmega]; [\perp\omega \in \top\varOmega])$ $^{\top}$; ([*e*| *upset*$_{\perp\omega}\langle$CON *e*, $\top\delta\rangle$, $\vartheta_{\perp\omega} e \subset_i$

$\top\tau]$; [MAX$\langle\top\varOmega, exp_{\top\omega}\top\varepsilon\rangle \subseteq \perp\omega\|_{\top\varepsilon}]$))); $^{\top}[p| p = \top\omega\|]$

In the follow-up conditional (73ii), the topical antecedent hypothesis is the less desirable sub-domain, relative to the winning worlds ($\perp\omega_2$), where Jim loses the aforementioned ($\perp\tau$-)competition. The topic time for the matrix comment is the consequent time of that defeat. This topical future ($\top\tau$) and the remote hypothetical worlds ($\perp\omega$) satisfy the presuppositions of the matrix modal (*would* or *might*). If the modal is *would*, then the main attitudinal comment is that, within the antecedent modality where Jim loses (current $\top\varOmega$), in the worlds the speaker considers most likely Sue gets upset during the consequent time of Jim's defeat. If the modal is *might*, then this holds for a non-empty sub-domain of the antecedent losing modality.

8 CONCLUSION

Conditionals are a species of attitude reports in English as in Kalaallisut, albeit with different details. This contradicts one English-based theory (Heim 1992), but most well established theories of attitudes, indicative and counterfactual conditionals, and modal and temporal reference in English are compatible with this proposal or require only modest revisions (like the studies cited in §7). Some seemingly conflicting claims about English (e.g. Thomason 1984 vs. Kamp and Reyle 1983 on the future *will*) are reconciled as context-dependent special cases of the proposed cross-linguistic theory. This proposal also explains the widespread use of 'fake past' in remote conditionals, by extending the standard theory of past tense as temporal precedence to a parallel theory of remoteness as attitudinal precedence.

This case study also illustrates some larger points. First, languages may disagree on grammatical means, like Kalaallisut and English on all the major typological traits and consequently on observations about the syntax-semantics interface, such as Observations 1–6. Nevertheless, if we take each language at face value and interpret it exactly as is, then we may find that languages agree on bottom line semantic effects, e.g. that conditionals are modal topic-comment sequences and a species of attitude reports.

Second, parochial theories, based on one language or one linguistic type, are liable to mistake parochial observations for semantic universals. For example, theories that talk about modals or tenses in 'natural language' are falsified by Kalaallisut, which does not have either category. It is therefore important to realize that these are in fact parochial theories of whatever they are based on—one linguistic type (e.g. tense-based languages, for Iatridou 2000) or one language (e.g. English, for Kamp and Reyle 1993, Stone 1997, Brasoveanu 2007, and others). A theory based exclusively on English cannot be more than a theory of English. Other languages must be analyzed in terms of their own categories and with the same open mind and attention to empirical detail and formal explicitness that has been lavished on English, if a genuine theory of semantic universals is to become a reality.

Last but not least, there is also the converse risk, for parochial theories are also liable to miss true semantic universals if that particular grammatical system happens to obscure them. For example, English-based theories have missed the universal that conditionals are attitude reports, because in English attitudinal items happen to be syntactically heterogeneous, including attitude verbs like *want*, complementizers like *if*, and 'fake' past tense inflections. Evidence from another linguistic type, Kalaallisut, is more transparent.

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REFERENCES

Adams, E. 1970. Subjunctive and indicative conditionals. *Foundations of Language* **6**: 89–94.

Berg, M. van den. 1996. *Some Aspects of the Internal Structure of Discourse: The Dynamics of Nominal Anaphora.* Ph. D. thesis, University of Amsterdam, ILLC.

Bittner, M. 2001. Topical referents for individuals and possibilities. *Proceedings from SALT XI* (R. Hastings *et al.*, eds.), pp. 33–55. CLC, Ithaca.

Bittner, M. 2005. Future discourse in a tenseless language. *Journal of Semantics* **22**:339–87

Bittner, M. 2008. Aspectual universals of temporal anaphora. In: *Theoretical and Cross-linguistic Approaches to the Semantics of Aspect.* (S. Rothstein, ed.), Ch. 11, pp. 349–85. John Benjamins, Amsterdam.

Bittner, M. *t.a.*. Tense, mood, and centering. In *Tense across Languages* (R. Musan and M. Rathert, eds.) Niemeyer, Tübingen.

Brasoveanu, A. 2007. *Structured Nominal and Modal Reference.* Ph. D. thesis, Rutgers University, New Brunswick NJ.

Condoravdi, C. 2002. Temporal interpretation of modals. In: *The Construction of Meaning* (D. Beaver *et al.*, eds.), pp. 59–88. CSLI, Stanford.

Dekker, P. 1994. Predicate Logic with Anaphora. *Proceedings from SALT* IV (M. Harvey and L. Santelmann, eds.), pp. 79–95. CLC, Ithaca.

Ebert, Ch. *et al.* 2008. A unified analysis of indicative and biscuit conditionals as topics. *Proceedings from SALT* XVIII (T. Friedman and S. Ito, eds.), pp. 266–83.

Foley, W. and R. van Valin Jr. 1985. Information packaging in the clause. In: *Language Typology and Syntactic Description*, Vol. I: *Clause Structure* (T. Shopen, ed.), pp. 282–364. Cambridge University Press, Cambridge.

Fortescue, M. 1984. *West Greenlandic*. Croom Helm, London.

Haiman, J. 1978. Conditionals are topics. *Language* **54**:564–89.

Haiman, J. and P. Munro, eds. 1983. *Switch Reference and Universal Grammar.* John Benjamins, Amsterdam.

Heim, I. 1992. Presupposition projection and the semantics of attitude verbs. *Journal of Semantics* **9**:183–221.

Hintikka, J. 1969. Semantics for propositional attitudes. In: *Philosophical Logic* (J. W. Davis *et al.*, eds.), pp. 21–45. D. Reidel, Dordrecht.

Iatridou, S. 2000. The grammatical ingredients of counterfactuality. *Linguistic Inquiry* **31**:231–70.

Isard, S. 1974. What would you have done if… *Theoretical Linguistics* **1**:233–55.

Jelinek, E. 1984. Empty categories, case, and configurationality. *Natural Language & Linguistic Theory* **2**:39–76.

Kamp, H. 1979. Events, instants, and temporal reference. In: *Semantics from Different Points of View* (R. Bäuerle *et al.*, eds.), pp. 376–471. de Gruyter, Berlin.

Kamp, H. and U. Reyle 1993. *From Discourse to Logic.* Kluwer, Dordrecht.

Kaplan, D. 1978. On the logic of demonstratives. *Journal of Philosophical Logic* **8**:81-98

Kleinschmidt, S. 1851. *Grammatik der grönländischen sprache.* von G. Reimer, Berlin.

Kratzer, A. 1981. The notional category of modality. In: *Words, Worlds, and Contexts* (H.-J. Eijkmeyer and H. Rieser, eds.), pp. 38–74. de Gruyter, Berlin.

Lewis, D. 1973. Counterfactuals and comparative possibility. *Journal of Philosophical Logic* **2**:418–46.

Lewis, D. 1979. Attitudes *de dicto* and *de se*. *The Philosophical Review* **88**:513–43.

Lewis, D. 1981. Ordering semantics and premise semantics for counterfactuals. *Journal of Philosophical Logic* **2**:217–34.

Maier, E. 2006. *Belief in Context: Towards a unified semantics of* de re *and* de se *attitude reports*. Ph.D. thesis, Radboud University Nijmegen.

Moens, M. and M. Steedman. 1988. Temporal ontology and temporal reference. *Computational Linguistics* **14**:15–28.

Muskens, R. 1995. Tense and the logic of change. In: *Lexical Knowledge in the Organization of Language* (U. Egli *et al.*, eds.), pp. 147–84. Benjamins, Philadelphia.

Partee, B. 1973. Some structural analogies between tenses and pronouns in English. *Journal of Philosophy* **70**:601–9.

Partee, B. 1984. Nominal and temporal anaphora. *Linguistics and Philosophy* **7**:243–86.

Reichenbach, H. (1947) *Elements of Symbolic Logic*. MacMillan, New York.

Schlenker, Ph. 2003. A plea for monsters. *Linguistics and Philosophy* **26**:29–120.

Schlenker, Ph. 2004. Conditionals as definite descriptions (A referential analysis). *Research on Language and Computation* **2**:417–62.

Schulz, K. 2007. *Minimal Models in Semantics and Pragmatics: Free Choice, Exhaustivity, and Conditionals*. Ph. D. thesis, University of Amsterdam, ILLC.

Stalnaker, R. 1975. Indicative conditionals. *Philosophia* **5**:269–86.

Stalnaker, R. 1978. Assertion. In: *Syntax and Semantics* 9: *Pragmatics*. (P. Cole, ed.), pp. 315–32. Academic Press, New York.

Stalnaker, R. 1984. *Inquiry*. MIT Press, Cambridge MA.

Steedman, M. 2000. *The Syntactic Process*. MIT Press, Cambridge, MA.

Stone, M. 1997. The anaphoric parallel between modality and tense. Technical Report IRCS 97–6. [pdf at http://www.cs.rutgers.edu/~mdstone]

Stone, M. and D. Hardt. 1999. Dynamic discourse referents for tense and modals. In: *Computing Meaning* (H. Bunt *et al.*, eds.), pp. 301–20. Kluwer, Dordrecht.

Thomason, R. 1984. Combinations of tense and modality. In: *Handbook of Philosophical Logic* (D. Gabbay and F. Guenther, eds.), Vol. II. 135–66. D. Reidel, Dordrecht.

Veltman, F. 1996. Defaults in update semantics. *Journal of Philosophical Logic* **25**:221–61.

Walker, M. *et al*, eds. 1998. *Centering Theory in Discourse*. Clarendon Press, Oxford.

Webber, B. 1988. Tense as discourse anaphor. *Computational Linguistics* **14**:61–73.