INDIVIDUALS AND POSSIBILITIES (1):
Notes on Stone (1999) 'Reference to Possible Worlds'

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- **Referential parallel**: N and V refer to individuals and possible scenarios
- **Anaphoric parallel 1**: Discourse referents as concepts with restricted domains
- **Anaphoric parallel 2**: Anaphora constrained by domain restrictions, not embedding

1. REFERENCE TO INDIVIDUALS AND POSSIBILITIES IN SIMPLE CLAUSES AND BELOW

(1) Ty2: $\textit{car}_w(x)$ 'in world w, entity x is a car'

Stone 1999: $\textit{car}_\omega\{u\}$ 'throughout possibility ω, concept u is realized as a car'
(NOTATION: ω for reality, ω′, ω″, … for other possibilities)

(2) John has a car.

- Extensional DRT semantics

$$\text{v}[x, y|\ x = \textit{john}, \textit{car}(y), \textit{have}(x, y)]\text{b}^M = \{\langle g, h\rangle|\ g[x, y]h\ \&\ h(x) = I(\textit{john})\ \&\ h(y) \in I(\textit{car})\ \&\ \langle h(x), h(y)\rangle \in I(\textit{have})\}$$

- Recast in type logic (Muskens 1995)

$$[u, v|\ u = \textit{john}, \textit{car}(v), \textit{have}(u, v)] := \lambda ij.i[u, v]j \wedge u = \textit{john}\ \&\ \textit{car}(vj) \wedge \textit{have}(uj, vj)$$

- Reference to possible scenarios (Stone 1997, 1999, no need for Kratzer's covert u)

$$[\omega\colon u, v|\ u\ \mathbf{is}_\omega\ \textit{john}, \textit{car}_\omega\{v\}, \textit{have}_\omega\{u, v\}] := \lambda ij.i[\omega\colon u, v]j \wedge \forall w(\exists w_0(w \in \omega jw_0) \rightarrow \textit{ujw} = \textit{john} \wedge \textit{car}_w(vjw) \wedge \textit{have}_w(ujw, vjw))$$

$$i[\omega\colon u_1, \ldots, u_n]j := \forall v(\mathbf{mk}(v) \wedge u_1 \neq v \wedge \ldots u_n \neq v \rightarrow vi = vj) \wedge \forall w(\exists w_0(w \in \omega jw_0) \rightarrow u_1 jw\ \mathbf{in}\ w \wedge \ldots\ u_n jw\ \mathbf{in}\ w)$$

(3) Crosscategorial mood in Eskimo, e.g., *-ssa* 'expectative (EXP)'

a. aqqati-tit mirsur-pa-kka. [ω: *v*, *e*|
mittens-your sew-FCT^2-1SG.3PL *mittens-of*$_\omega\{v, you\}$, *sew*$_\omega\{e, me, v\}$]
'I {sewed, am sewing} your mittens.' (real mittens, real sewing)

b. aqqati-tit mirsu-*ssa*-va-kka. [ω: *v*| *mittens-of*$_\omega\{v, you\}$] ;
mittens-your sew-*EXP*-FCT^2-1SG.3PL [ω: ω′| *expected*$_\omega\{\omega'\}$] ; [ω′: *e*| *sew*$_{\omega'}\{e, me, v\}$]
'I will sew your mittens' (real mittens, exp. sewing)

c. aqqati-*ssa*-tit mirsur-pa-kka. [ω: ω′| *expected*$_\omega\{\omega'\}$]; [ω′: *v*| *mittens-of*$_{\omega'}\{v, you\}$];
mittens-*EXP*-your sew-FCT^2-1SG.3PL [ω: *e*| *sew*$_\omega\{e, me, v\}$]
'I am sewing your mittens' (exp. mittens, real sewing)

d. aqqati-*ssa*-tit mirsu-*ssa*-va-kka. [ω: ω′| *expected*$_\omega\{\omega'\}$]; [ω′: *v*| *mittens-of*$_{\omega'}\{v, you\}$];
mittens-*EXP*-your sew-*EXP*-FCT^2-1SG.3PL [ω′: *e*| *sew*$_{\omega'}\{e, me, v\}$]
'I will sew your mittens' (exp. mittens, exp. sewing)

(4) Functional heads as mood indicators: {NOM, FIN} ~ ω, {OBL, INF} ~ ω′

	English	*Polish*	*Eskimo*	*DRS* (1st guess)
a.	Water. (pointing)	Woda. 'water.NOM'	Imiq. 'water.NOM'	[| *water*$_\omega\{v\}$]
	Water! (wish)	Wod-*y*! 'water-GEN'	Imir-*mik*! 'water-INS'	[| *water*$_{\omega'}\{v\}$]
b.	I'm going out.	Wycho*dze*. 'go.out-*PRS*.1SG'	Ani-*vu*-nga. 'go.out-*FCT*^{1}-1SG'	[ω: *e*| *go.out*$_\omega\{e, me\}$]
	Go out!	Wyj*sc*! 'go.out-*INF*'	Ani-*llu*-tit! 'go.out-*INF*-2SG'	[ω′: *e*| *go.out*$_{\omega'}\{e, you\}$]

2. NOMINAL AND MODAL ANAPHORA

- *Basic anaphoric parallel*

(5) A bear came in. $[\omega\colon v|\ bear_{\omega}\{v\}, come\text{-}in_{\omega}\{v\}]$
$:= \lambda ik.i[\omega\colon v]k \wedge \forall w(\exists w_0(w \in \omega k w_0) \rightarrow bear_w(vkw) \wedge come\text{-}in_w(vkw))$

I shot it. $[\ |\ shoot_{\omega}\{me, v\}]$
$:= \lambda kj.k[\ ]j \wedge \forall w(\exists w_0(w \in \omega j w_0) \rightarrow shoot_w(me, vjw))$

(6) Suppose a bear comes in. $\mathbf{if}(\omega, \omega', [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}])$
$:= \lambda ij.\exists k(i[\omega\colon \omega']k \wedge [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}]kj)$
$\wedge \forall h(\exists k(i[\omega\colon \omega']k \wedge [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}]kh) \rightarrow$
$\forall w(\exists w_0(w \in \omega i w_0) \rightarrow$
$\forall w_h w_j(w_h \in \omega' h w \wedge w_j \in \omega' j w \wedge w_h \leq_w w_j \rightarrow w_j \leq_w w_h))$
$\wedge \forall w_h(w_h \in \omega' h w \rightarrow \exists w_j(w_j \in \omega' j w \wedge w_j \leq_w w_h))))$

(Then) I will shoot it. $[\ |\ shoot_{\omega'}\{me, v\}]$
$:= \lambda jk.j[\ ]k \wedge \forall w(\exists w_0(w \in \omega' j w_0) \rightarrow shoot_w(me, ujw))$

(6′) If a bear comes in, I will shoot it. = (6)
$\mathbf{if}(\omega, \omega', [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}])$; $[\ |\ shoot_{\omega'}\{me, v\}]$

(7) If John were honest, you would trust him.
$\mathbf{if}(\omega, \omega', [\ |\ honest_{\omega'}\{john\}])$; $[\ |\ trust_{\omega'}\{you, john\}]$;

If you trusted John, he would cheat you.
$\mathbf{if}(\omega, \omega'', [\ |\ trust_{\omega''}\{you, john\}])$; $[\ |\ cheat_{\omega''}\{john, you\}]$

If John were honest, he would cheat you.
$\mathbf{if}(\omega, \omega', [\ |\ honest_{\omega'}\{john\}])$; $[\ |\ cheat_{\omega'}\{you, john\}]$;

- *Modal items as anaphorically linked predicates of possibilities*

(8) Stone 1997, 1999 (Parameters: } modal base, – ordering source)
$\mathbf{necc}_{\},\ \_}(\omega_1, \omega_2) := \lambda i.\forall w(\exists w'(w' \in \omega_1 i w) \rightarrow$
$\forall w'(w' \in \omega_1 i w \wedge \}w' \wedge \forall w''(w'' \in \omega_1 i w \wedge \}w'' \wedge w'' \__w w' \rightarrow w' \__w w'')$
$\rightarrow w' \in \omega_2 i w'))$
(For all $w \in$ Dom $\omega_1 i$, every }-accessible –-best world w' in $\omega_1 i w$ is in $\omega_2 i w'$.)

$\mathbf{poss}_{\},\ \_}(\omega_1, \omega_2) := \lambda i.\forall w(\exists w'(w' \in \omega_1 i w) \rightarrow$
$\exists w'(w' \in \omega_1 i w \wedge \}w' \wedge \forall w''(w'' \in \omega_1 i w \wedge \}w'' \wedge w'' \__w w' \rightarrow w' \__w w'')$
$\wedge w' \in \omega_2 i w'))$
(For all $w \in$ Dom $\omega_1 i$, some }-accessible –-best world w' in $\omega_1 i w$ is in $\omega_2 i w'$.)

$\mathbf{not}_{\},\ \_}(\omega_1, \omega_2) := \lambda i.\forall w(\exists w'(w' \in \omega_1 i w) \rightarrow$
$\neg\exists w'(w' \in \omega_1 i w \wedge \}w' \wedge \forall w''(w'' \in \omega_1 i w \wedge \}w'' \wedge w'' \__w w' \rightarrow w' \__w w'')$
$\wedge w' \in \omega_2 i w'))$
(For all $w \in$ Dom $\omega_1 i$, no }-accessible –-best world w' in $\omega_1 i w$ is in $\omega_2 i w'$.)

(9) If a murder occurs, the jurors *must* convene.
$\mathbf{if}(\omega, \omega', [\omega'\colon v|\ murder_{\omega'}\{v\}, occur_{\omega'}\{v\}])$; $\mathbf{if}(\omega', \omega'', [\omega''\colon u|\ jurors\text{-}for_{\omega''}\{u, v\}, convene_{\omega''}\{u\}])$;
$[\ |\ \mathbf{necc}_{\},\ \_}(\omega', \omega'')]$

(10) If a bear comes in, I will *perhaps* shoot it.
$\mathbf{if}(\omega, \omega', [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}])$; $\mathbf{if}(\omega', \omega'', [\ |\ shoot_{\omega''}\{me, v\}])$; $[\ |\ \mathbf{poss}_{\},\ \_}(\omega', \omega'')]$

(11) If a bear comes in, I will *not* shoot it.
$\mathbf{if}(\omega, \omega', [\omega'\colon v|\ bear_{\omega'}\{v\}, come\text{-}in_{\omega'}\{v\}])$; $\mathbf{if}(\omega', \omega'', [\ |\ shoot_{\omega''}\{me, v\}])$; $[\ |\ \mathbf{not}_{\},\ \_}(\omega', \omega'')]$

(12) If I were taller, I wouldn't be comfortable sleeping on two airline seats.

3. SUBORDINATION AS TOP LEVEL CONCEPT ANAPHORA

- *Negation*

(13) John has$_{\omega}$ *a car*^{v}.
It$_{v}$ is$_{\omega}$ in the garage.

[ω: *v*| *car*$_{\omega}${*v*}, *have*$_{\omega}${*john*, *v*}];
[| *in-the-garage*$_{\omega}${*v*}]

(14) John does$_{\omega}$ not$^{\omega'}$ have *a car*^{v}.
It$_{v}$ {would be$_{\omega'}$, #is$_{\omega}$} in the garage.

if(ω, ω′, [ω′: *v*| *car*$_{\omega}${*v*}, *have*$_{\omega}${*john*, *v*}]); [| **not**$_{\}, \_}$(ω, ω′)] ;
[| *in-the-garage*$_{\omega'}${*v*}]

(15) Juuna biili-qar-pu-q.
Juuna car^{v}-have-FCT$_{\omega}$-3SG

[ω: *v*| *car*$_{\omega}${*v*}, *have*$_{\omega}${*john*, *v*}];

Unittittarfim-mi=ip-pu-q.
garage-in=be-FCT$_{\omega}$-3SG$_{v}$

[| *in-the-garage*$_{\omega}${*v*}]

(16) Juuna biili-qa-nngi-la-q.
Juuna car^{v}-have-not-SUBJ$^{\omega'}$-3SG

if(ω, ω′, [ω′: *v*| *car*$_{\omega}${*v*}, *have*$_{\omega}${*juuna*, *v*}]); [| **not**$_{\}, \_}$(ω, ω′)];

Unittittarfim-mi=i-*ssa*-*galuar*-pu-q.
garage-in=[be-*EXP*$_{\omega'}$-*IRR*$_{\omega'}$]-FCT$_{\omega}$-3SG$_{v}$

[| *in-the-garage*$_{\omega'}${*v*}, <u>*expected*$_{\omega}${ω′}</u>, <u>*unrealized*$_{\omega}${ω′}</u>]

(17) Anne Marie-*ssa*-qa-nngi-la-gut
[Anne Marie-*EXP*]-be.at-not-SUBJ-1PL
'We don't have any Anne Marie.'

if(ω, ω′, [ω′: *v*| *expected*$_{\omega}${ω′}, *v* ∼$_{\omega'}$ *anne marie*, *at*$_{\omega'}${*v*, *we*}];
[| **not**$_{\}, \leq}$(ω, ω′)]

- *Other modal predicates*

(18) If a bear comes in,
John *could*$_{\text{circ}}$ escape.
But Bill *might*$_{\text{epi}}$ just freeze.

if(ω, ω′, [ω′: *v*| *bear*$_{\omega'}${*v*}, *come-in*$_{\omega'}${*v*}]);
if(ω′, ω″, [| *escape*$_{\omega''}${*john*}]); [| **poss**$_{\}\text{circ}, \_}$(ω′, ω″)]
if(ω′, ω‴, [| *freeze*$_{\omega'''}${*bill*}]); [| **poss**$_{\}\text{epi}, \_}$(ω′, ω‴)]

(19) If a bear comes in,
legally you can't shoot it,
but *hopefully* you will.

if(ω, ω′, [ω′: *v*| *bear*$_{\omega'}${*v*}, *come-in*$_{\omega'}${*v*}]);
if(ω′, ω″, [| *shoot*$_{\omega''}${*you*, *v*}]); [| **not**$_{\}, \text{–}legal}$(ω′, ω″)];
[| **necc**$_{\}, \text{–}hoped\text{-}for}$(ω′, ω″)]

(20) A bear *might* come in.
We *would be* safe,
because John *has* a gun.
He *would* use it to shoot it.

if(ω, ω′, [ω′: *v*| *bear*$_{\omega'}${*v*}, *come-in*$_{\omega'}${*v*}]); [| **poss**$_{\}, \_}$(ω, ω′)];
[| *safe*$_{\omega'}${*we*}];
[ω: *u*, *u*′| *u* **is**$_{\omega}$ *john*, *gun*$_{\omega}${*u*′}, *have*$_{\omega}${*u*, *u*′}];
[ω′: ω″| *use-to*$_{\omega'}${*u*, *u*′, ω″}]; [| *shoot*$_{\omega''}${*u*, *v*}] (cf. INF in (4b))

(21) There are two people in the room.
If one of them leaves the room,
there will still be one prs in the rm.

[ω: *u*, *v*| **person*$_{\omega}${*u*}, *two*$_{\omega}${*u*}, *in*$_{\omega}${*u*, *v*}, <u>*the-room*$_{\omega}${*v*}</u>];
if(ω, ω′, [ω′: *u*″| *one*$_{\omega'}${*u*″}, *u*′ ⊆$_{\omega'}$ *u*, *leave*$_{\omega'}${*u*′, *v*}]);
[ω′: *u*″| *person*$_{\omega'}${*u*″}, *one*$_{\omega'}${*u*″}, *in*$_{\omega'}${*u*″, *v*}, <u>*the-room*$_{\omega}${*v*}</u>]

(22) Aqqati-*ssa*-tit
mittens^{v}-*EXP*$^{\omega'}$-your

[ω: ω′| *expected*$_{\omega}${ω′}]; [ω′: *v*| *mittens-of*$_{\omega'}${*v*, *you*}];

mirsur-pa-kka.
sew^{e}-FCT$_{\omega}$-1SG.3PL$_{v}$

[ω: *e*| *sew*$_{\omega}${*e*, *me*, *v*}];

Uqqurtu-rujussu-u-{*ssa*, #∅}-ppu-t
warm-very-be-{*EXP*$_{\omega'}$, #∅}-FCT$_{\omega}$-3PL$_{v}$

[| *very-warm*$_{\omega'}${*v*}, *expected*$_{\omega}${ω′}]