Coordination

* Bringing together like types by a connective.
  {and, or, but?

↳ Nominal coordination

Every girl and a boy passed.

Every girl: S/(S\NP) ⟨⟨e,t⟩,t⟩
a boy: S/(S\NP) ⟨⟨e,t⟩,t⟩

I saw every kid and a man.

* John and walks passed.
  John: NP
  walks: S\NP

[X and X
  on
  bot]

↳ Verbphrase coordination

John talks and walks.
John loves Mary and walks.
loves Mary: S\NP
walks: S\NP

Sentence
Verb-phrase Coordination

~~John walks and talks.~~

John walks | and | Mary talks.
S | ? := (S\S)/S | S

? ⇒ S\S

S

walk' j' ∧ talk' m'

* binary branching
* adjacency

⇒ $and_1 := (S \backslash S)/S$

$\lambda p\, \lambda q.\ p \wedge q$
t t t

$\langle t, \langle t, t \rangle \rangle$

Verb-phrase Coordination

$and_2 := (S \backslash NP) \backslash ((S \backslash NP)/(S \backslash NP))$

$\lambda p \lambda q \lambda x.\ q\,x \wedge p\,x$

e^{α} e^{α}

$\langle \langle e, t \rangle, \langle \langle e, t \rangle, \langle e, t \rangle \rangle \rangle$

α α α

John walks and talks.

S

$((S \backslash NP) \backslash (S \backslash NP))/(S \backslash NP)$: $\lambda p \lambda q \lambda x.\ q\,x \wedge p\,x$

John : NP

walks : $S \backslash NP$, walks'

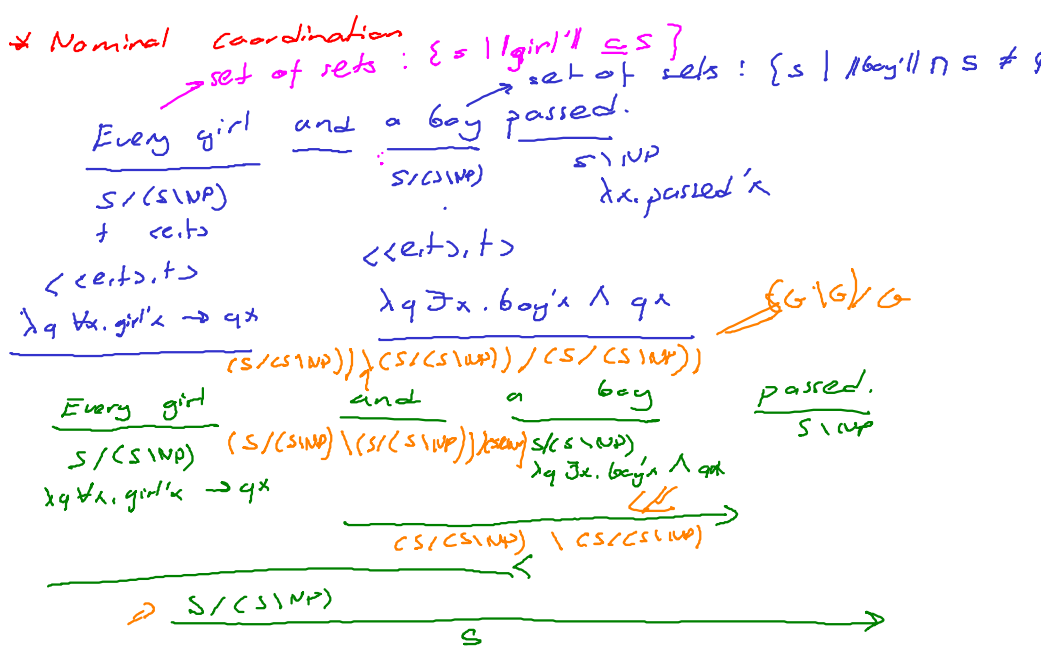
and

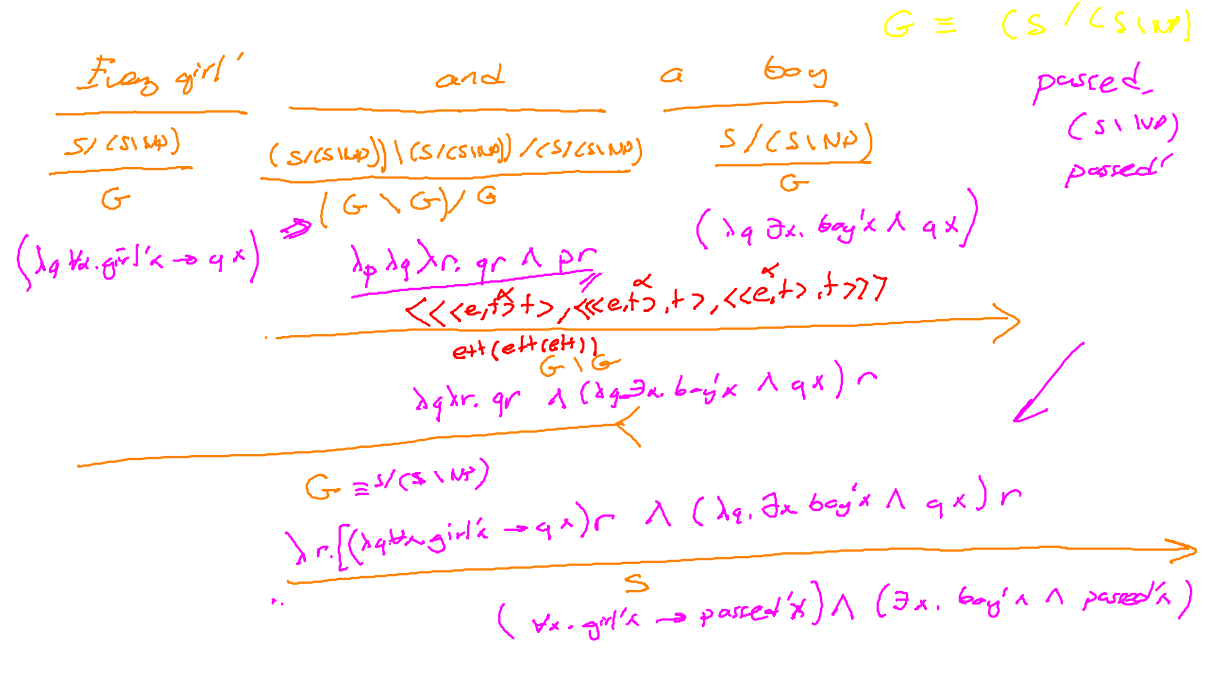
talks : $S \backslash NP$: talks'

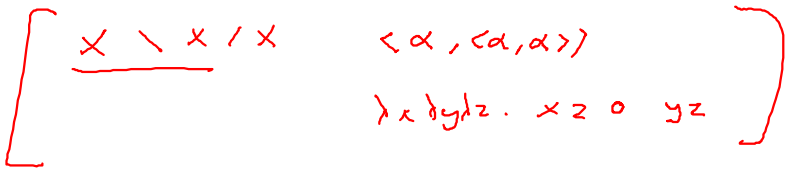
$(S \backslash NP) \backslash (S \backslash NP)$: $\lambda q \lambda x.\ q\,x \wedge talks'\,x$

$S \backslash NP$: $\lambda x.\ walks'\,x \wedge talks'\,x$

S : $walks'\,j' \wedge talks'\,j'$


* Nominal coordination
set of sets : {s | ||girl'|| ⊆ s}
set of sets : {s | ||boy'|| ∩ s ≠ ∅}
Every girl
and
a boy
passed.
S/(S\NP)
S/(S\NP)
S\NP
λx. passed'x
t
<e,t>
<<e,t>,t>
<<e,t>,t>
λq ∀x. girl'x → qx
λq ∃x. boy'x ∧ qx
(S/(S\NP))\((S/(S\NP))/(S/(S\NP)))
(G\G)/G
Every girl
and
a boy
passed.
S/(S\NP)
(S/(S\NP))\((S/(S\NP))/(S/(S\NP)))
S/(S\NP)
S\NP
λq ∀x. girl'x → qx
λq ∃x. boy'x ∧ qx
(S/(S\NP)) \ (S/(S\NP))
S/(S\NP)
S


G ≡ (S / (S \ NP)) passed (S \ NP) passed'
Every girl'
S/(S\NP)
G
(λq ∀x. girl'x → qx)
and
(S/(S\NP))\(S/(S\NP))/(S/(S\NP))
(G\G)/G
λp λq λr. qr ∧ pr
<<<e,t>,t>,<<e,t>,t>>,t>
ett(ett(ett))
G\G
a
boy
S/(S\NP)
G
(λq ∃x. boy'x ∧ qx)
λq λr. qr ∧ (λq ∃x. boy'x ∧ qx) r
G ≡ S/(S\NP)
λr.[(λq ∀x. girl'x → qx) r ∧ (λq. ∃x boy'x ∧ qx) r
S
(∀x. girl'x → passed'x) ∧ (∃x. boy'x ∧ passed'x)


X \ X / X
<α, <α, α>>
λx λy λz . x z o y z

John and every kid walks.

~~NP~~ S/(S\NP) | S/(S\NP)

type raising

NP : j'

S/(S\NP) : λp.pj'

John sleeps.

S/(S\NP) (S\NP)

(λp.pj') (sleeps')

S : sleeps'j'

Every kid : $\{s \mid \|kid'\| \subseteq s\}$ $\lambda q\, \forall x.\, kid'x \to qx$

A kid : $\{s \mid \|kid'\| \cap s \neq \emptyset\}$

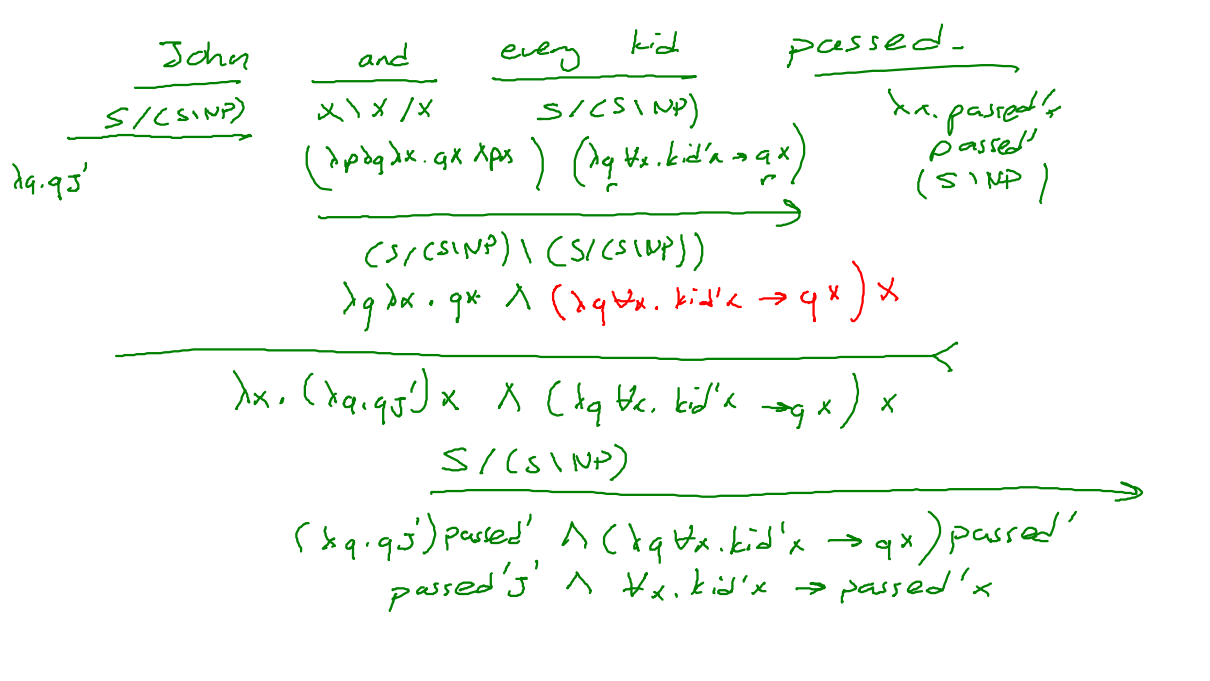
No kid : $\{s \mid \|kid'\| \cap s = \emptyset\}$

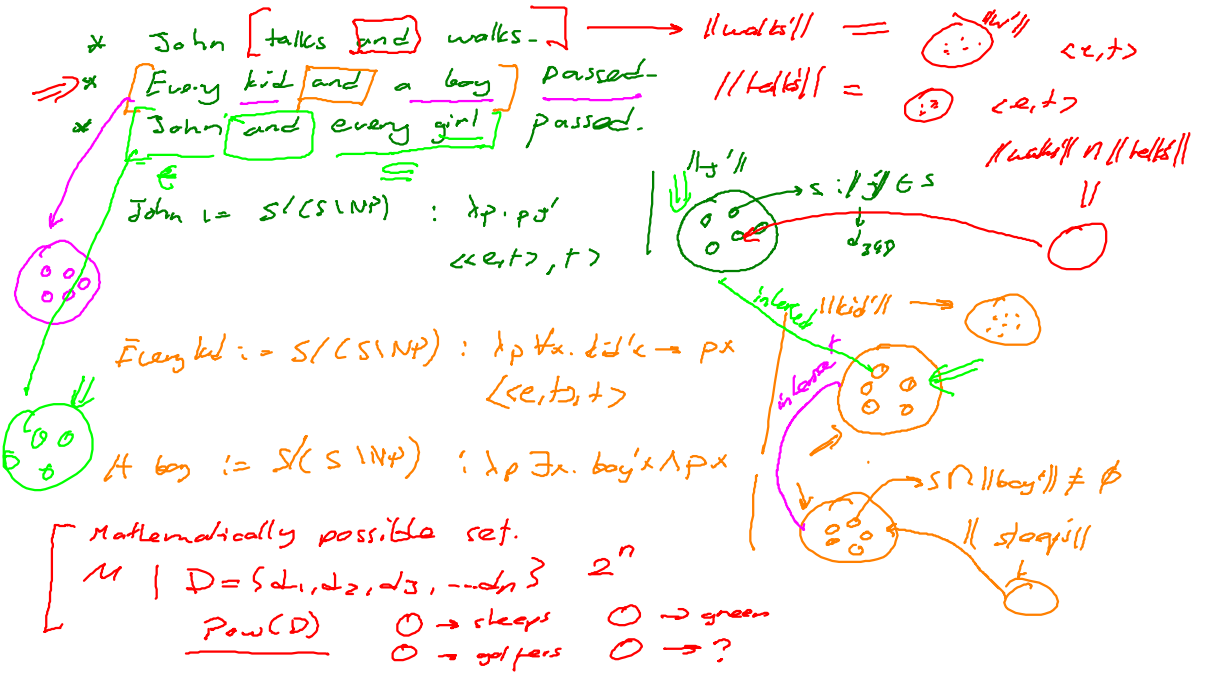
John : $\{s \mid \|j'\| \in S\}$: $\lambda P.\, P\, j'$
(e→t)

[raised interpretation]

1

d_2


John
and
every kid
passed.
S/(S\NP)
X\X/X
S/(S\NP)
λx. passed'x
passed'
(S\NP)
λq.qJ'
(λpbqλx. qx ∧ px) (λq ∀x. kid'x → qx)
(S/(S\NP))\(S/(S\NP))
λqλx. qx ∧ (λq ∀x. kid'x → qx) x
λx. (λq.qJ') x ∧ (λq ∀x. kid'x → qx) x
S/(S\NP)
(λq.qJ') passed' ∧ (λq ∀x. kid'x → qx) passed'
passed'J' ∧ ∀x. kid'x → passed'x


* John [talks and walks.]
* [Every kid and a boy] passed.
* [John and every girl] passed.
John := S/(S\NP) : λp. pj'
Every kid := S/(S\NP) : λp ∀x. kid'x → px
A boy := S/(S\NP) : λp ∃x. boy'x ∧ px
||walks'|| = ||talks'|| =
<e,t>
||walks'|| ∩ ||talks'||
||j'||
s : j' ∈ s
||kid'||
||boy'||
s ∩ ||boy'|| ≠ ∅
||sleeps'||
Mathematically possible set.
M | D = {d1, d2, d3, ... dn}
2^n
Pow(D)
○ → sleeps
○ → golfers
○ → green
○ → ?