

(In)dependence of features on composite probes *

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1. Introduction

This paper aims to shed further light on the syntactic-typological nature of composite A'/A probes and their distribution in cross-clausal A-dependency configurations (CCA).

CCA are A-dependencies (e.g. raising to subject/object, agreement, case assignment) between a matrix element (e.g. predicate) and a DP inside an embedded CP complement clause, namely Hyperraising [HyR], Hyper-ECM or long-distance agreement [LDA] (summarized under the term CCA, following Wurmbrand 2019). In languages like English or German, instances of CCA are ungrammatical (**I believe that her won the triathlon* or **She seems that won the triathlon.*). A wide variety of unrelated languages, however, does not rule out CCA categorically. For example, Mongolian allows HyR to object in (1a), and Cantonese allows HyR to subject in (1b). For an extensive overview and a broad typological examination of CCA, see Wurmbrand (2019), Lohninger et al. (2022), Lohninger (To appear).

- (1) a. Bat **nokhoi-g** chang-aar [*t* gaikhal-ta gej] khel-sen.
Bat **dog-ACC** loudly [*t* wonder-with COMP] say-PST
'Bat said loudly that dogs are wonderful.'

Mongolian HyR to object (Fong 2019:3)

- b. **Coeng jyu** gamgok/tengman [waa *t* m-wui ting].
CL **rain** feel.like/hear [COMP *t* not-will stop]
'It is felt/heard that the rain will not stop.'

Cantonese HyR to subject (Lee and Yip To appear:3)

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As standardly assumed in languages like English, CCA is ruled out by a combination of the *Ban on Improper Movement* and the *Phrase Impenetrability Condition*:

- (2) **Ban on Improper Movement [BIM]**: An element may not be moved from an A'-to an A-position; an A-chain cannot follow an A'-chain. (Chomsky 1973)
- (3) **Phase Impenetrability Condition [PIC]**: In phase α with head H, the domain of H is not accessible to operations outside α , only H and its edge are accessible to such operations. (Chomsky 2000)

Lohninger et al. (2022) bring forward an analysis implementing CCA without abandoning BIM or PIC: they argue that CCA is the result of a composite A'/A-probe on embedded C, attracting and raising the embedded DP to SpecCP. The DP can then take part in a matrix A-dependency without violating PIC. Grounding on a featural perception of the A'/A distinction which ties the difference between A'- and A-dependencies to movement-attracting features instead of structural positions (van Urk 2015), the DP movement to SpecCP involves [A]-features and may feed into a matrix A-dependency without violating BIM. Therefore, languages allowing CCA can be explained by positing that their C carries [A]-features additional to its [A']-features, enabling CCA via SpecCP. Here, [A] includes features like [ϕ], [θ], [Case] and [D]; and [A'] includes features like [wh], [foc], [top], [rel], [Ev], or [δ].

In this paper, we examine the cross-linguistic variation in the featural structure of composite A'/A-probes and their distribution in CCA configurations. We first investigate two empirical differences of CCA across languages: (i) the presence/absence of semantic restrictions on the CCA.DP (e.g. topichood) and (ii) the (dis-)allowance of additional A'-movement (*wh*-movement, topicalisation, focalisation, relativisation) to co-occur with CCA from the same embedded clause. We show that these two differences are robustly correlated and classify languages into two groups: Type A, imposing semantic restrictions on CCA.DP and disallowing additional A'-movement; Type B, not imposing such semantic restrictions on CCA.DP and allowing additional A'-movement. We tie the correlation to two types of composite probes: *Dependent Composite Probes* for Type A and *Independent Composite Probes* for Type B. Type A languages exhibit obligatory conjoint probing of the [A']- and [A]-features on C, whereas Type B languages allow for the [A']- and [A]-parts to probe independently from each other. In other words, the features on composite probes are *systemically organized* in a *parameterized* way. The rest of this paper is organized as follows. Sect. 2 introduces the two composite probing mechanisms. Sect. 3 discusses the typological correlation between semantic restrictions and additional A'-movement. Sect. 4 gives an analysis couched in feature (in)dependence. Sect. 5 concludes the paper.

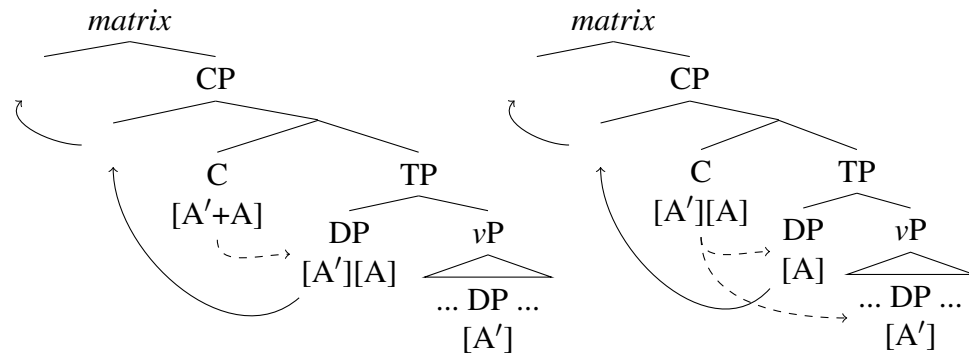
2. Two types of composite probes

While composite A'/A probes have been proposed across languages in different empirical domains (Obata and Epstein 2011, van Urk 2015, Erlewine 2018, Branam and Erlewine 2020, Coon et al. 2021, Chen 2022, *a.o.*), there is only little investigation of their probing mechanisms and cross-linguistic differences. As a notable exception, Scott (2021) sug-

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gests that composite A'/A probes differ in how dependent their subparts ([A'] and [A]) are from each other and classifies them into two types: *Dependent* and *Independent*. Dependent A'/A Probe needs to probe conjunctively and finds a Goal that satisfies both [A'] and [A]; whereas Independent A'/A Probe allows [A'] and [A] to probe independently from each other and find separate Goals (though not necessary). Such an analysis is extended by Lohninger et al. (2022) to CCA constructions. They propose that CCA languages also show (at least) a two-way split of probing, dubbed as Type A and Type B languages here:¹

- (4) a. Type A: Dependent Probing b. Type B: Independent Probing



The A-part of the composite probe enables CCA to be mediated through the CP-edge, whereas the A'-part, depending on the exact features, gives rise to a certain discourse-bound interpretation of the raised DP (e.g. [top] for topichood).

Empirical support for these two types of composite probes comes from the presence/absence of semantic requirements imposed on the CCA.DP. A set of languages (including Japanese, Korean, Romanian, Tsez, Turkish) requires a certain discourse-bound interpretation for the DP involved in CCA (e.g. topichood, Major Subject, D-linking, source of evidence). Japanese, for example, exhibits a referentiality restriction in (5): the HyR object *three men* needs to receive a definite reading; otherwise, HyR is not possible (Horn 2008).

- (5) Keisatu-wa **san.nin-no** **otoko-o** [*t* hannin da to] dantei.sita.
 police-TOP **three.CL-GEN** **man-ACC** [*t* culprit COP COMP] conclude-did
 'The police concluded that the three men/three of the men/*three men committed the crime.'
Japanese HyR (Horn 2008:233)

Romanian has an evidentiality/topic restriction on the CCA.DP. The DP undergoing CCA must be the source of evidence and a topic. CCA is ungrammatical with elements that cannot be topicalised, such as *someone* in (11).²

¹In Lohninger et al. (2022), in fact, a three-way split is proposed. Dependent probes are further divided into two subgroups (*Conjunctive* versus *Dependent*) based on A-Minimality. This distinction is not relevant to our purpose, and we refer to both types as *Dependent*.

²Importantly, HyR in languages with semantic restrictions is *not* pure long-distance A'-extraction. They still show A-characteristics, such as triggering case marking or agreement, creating new binding possibilities, and for some languages A-Minimality (Romanian: Alboiu and Hill 2016, Japanese: Horn 2008, Tsez: Polinsky and Potsdam 2001, Turkish: Şener 2008).

- (6) Am mirosit (***pe cineva**) [că *t* ne minte].
 have.1 smelled (***DOM someone**) [COMP *t* 1PL.DAT lies]
 Int.: ‘I/we suspected that someone was lying to us.’
Romanian HyR (Alboiu and Hill 2016:276)

Another set of languages (including Brazilian Portuguese, Buryat, Cantonese, Mongolian, Nez Perce, Passmaquoddy, Uyghur, Vietnamese, Zulu) does not impose semantic restrictions. DPs that often fail to A'-move, such as weak quantifiers, indefinites, NPIs, can undergo CCA in these languages. In Mongolian, for example, the hyperraised DP can be a non-referential NPI in (7). Similarly, in Cantonese, any DP can undergo CCA, even such which cannot be topicalised, like the weak quantifier *many people* in (8).³

- (7) Nara **khen-iig ch** [*t* iree-güi gej] khel-sen.
 Nara **who-ACC CH** [*t* come.PST-NEG COMP] say-PST
 ‘Nara said that nobody came.’ *Mongolian HyR* (Fong 2019:8)
- (8) **Houdo jan** (*ne,) gangok [waa *t* wui lai].
many person (*TOP) feel.like [COMP *t* will come]
 ‘It is felt that many people will come.’ *Cantonese HyR* (Lee and Yip To appear:18)

The two-way split of CCA languages follows straightforwardly from the two different composite probing mechanisms. Dependent Probe on C requires the Goal to carry both [A] and [A'], restricting CCA to DPs with a discourse-bound reading from the [A']-feature (e.g. [top]). Independent Probe, on the other hand, allows its two parts to probe separately. That is, only [A] is necessary for forming CCA, and [A'] is not required to participate in it. Hence, the selected DPs for CCA are free from semantic restrictions.

3. A novel typological correlation

We observe that the presence or absence of semantic restrictions laid out in Sect. 2 correlates with the possibility of additional A'-movement (wh-movement, topicalisation, focalisation or relativisation) simultaneously to CCA, amounting to a *novel* typological generalization, stated in (9). The two sets of languages are summarized in (10).

- (9) **A typological correlation in languages with CCA**
- a. Type A: If a language has semantic restrictions on the CCA.DP (i.e. it is Dependent Probing), *no* A'-element may be extracted from the same embedded clause from which the CCA.DP originates.
 - b. Type B: If a language does *not* have semantic restrictions on the CCA.DP (i.e. it is Independent Probing), A'-elements may be extracted from the same embedded clause from which the CCA.DP originates.

³Cantonese forms a minimal pair with Romanian in both limiting HyR to *predicates* encoding indirect evidence but differing in whether *CCA.DP* needs to be the evidence source (Lee and Yip To appear).

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(10) The typology of CCA with different composite probing mechanisms

Probing	Dependent (A)	Independent (B)
Semantic restriction on CCA.DP	✓	×
CCA + A'-movement	×	✓
Languages	Japanese, Korean, Romanian, Tsez, Turkish	Braz. Portuguese, Cantonese, Mongolian, Uyghur, Passamaquoddy, Vietnamese, Zulu (and Buryat, Nez Perce)

3.1 Dependent Probing: semantic restrictions & *A'-movement + CCA

Dependent Probing languages impose semantic restrictions on the CCA.DP and disallow additional A'-movement to co-occur with CCA. In Romanian (11), for example, long-distance *wh*-movement from the embedded clause is banned with HyR of the subject *Ion*.

- (11) *Ce l-ai simțit **pe Ion** [că *t* nu vrea t]?
what him-have.2SG felt **DOM Ion** [COMP *t* not wants t]
 Int.: 'What did you feel that Ion did not want?'
 **wh-movement* + HyR (Alboiu and Hill 2016:277)

Japanese (12) behaves the same: A'-elements on embedded CP edges, resulting from short A'-movement (e.g. topicalisation/focalisation), block HyR to object/Hyper-ECM.

- (12) *John-wa konkyomonaku [nihongo-wa/ nihongo-sae **Bill-o**
 John-TOP without.evidence [Japanese-TOP/ Japanese-even **Bill-ACC**
 hanas-e-ru-to] omot-ta.
 speak-can-PRES-REP] think-PAST
 Int.: 'John thought without any evidence/reason that as for Japanese, Bill could speak (it).' **Topicalisation (-wa)/Focalisation (-sae)* + HyR (K. Shimamura, p.c.)

In Korean, only a Major Subject (Yoon 2007) may HyR to object. Strikingly, long-distance A'-scrambling is not allowed with HyR in (13).

- (13) *Mwuncey-ka, na-nun [**Cheli(-eykey)-lul** t issta-ko] sayngkakh-a-n-ta.
problem-NOM I-TOP [**Cheli(-DAT)-ACC** t exist-COMP] think-PRS-DECL
 Int.: 'Problems, I think that Cheli has.'
 **Long-distance scrambling* + HyR (Jiyeong Kim p.c.)

Topichood is required for HyR and LDA DPs in Turkish (Şener 2008) and Tsez (Polinsky and Potsdam 2001) respectively. Consistent with the above patterns, Turkish bans the co-occurrence of long-distance A'-movement like relativisation in (14).

- (14) *[(biz-im) [**Mert-i** \bar{t} öp-tü diye] duy-duğ-umuz] kızı-Ø
 [(we-GEN) [**Mert-ACC** \bar{t} kiss-PAST COMP] hear-REL-1PL.POSS] girl-NOM
 hasta-y-mış.
 sick-COP-EVID.PAST
 Int.: ‘The girl that we heard that Mert kissed is sick.’
**Relativisation + HyR* (Şener 2008:34)

Note that Tsez bans long-distance movement for independent reasons. Still, short A'-movement in the *embedded* clause like *wh*-movement is disallowed with LDA in (15).

- (15) *enir [lu **micxir** b-ok'āk'-ru-ḥi] **b-iyxo**
 mother [who.ERG **money. III.ABS** III-steal-PSTPRT-NMLZ] **III-knows**
 Int.: ‘The mother knows who stole the money.’
**wh-movement + LDA* (Polinsky and Potsdam 2001:634)

3.2 Independent Probing: no semantic restrictions & A'-movement + CCA

In contrast to Dependent Probing, Independent Probing languages do not impose any semantic restrictions on CCA.DPs such that various kinds of elements can participate in CCA, including those that are banned in Dependent Probing languages (e.g. NPIs). Importantly, these languages *consistently* allow additional A'-movement simultaneously to CCA, showing the systematic correlation in (9). Cantonese, for example, allows focalisation, topicalisation and relativisation to co-occur with CCA from the same clause in (16).

- (16) a. Lin faahung **gaan gungsi** taipaa [\bar{t} dou m-wui paai \bar{t}].
even bonus CL **company** seem.fear [\bar{t} also not-will distribute \bar{t}]
 ‘It seems that the company will not even distribute the bonus.’
Focalisation + HyR
- b. Gam-do-ceot hei, **Aaming** gamgok [(waa) \bar{t} dou m-zungji tai \bar{t}].
that.many.CL film **Ming** feel.like [COMP \bar{t} all not-like watch \bar{t}]
 ‘All these many films, it is felt that Ming doesn’t like to watch.’
Topicalisation + HyR
- c. [**Go fung** gamgok [waa \bar{t} wui ceoilam \bar{t}]] ge syu.
 [CL **wind** feel.like [COMP \bar{t} will blow.down \bar{t}]] MOD tree
 ‘The tree which it is felt like the wind will blow down.’
Relativisation + HyR

Similarly, Vietnamese HyR, where no semantic restrictions are imposed on the HyR DPs (Lee and Yip To appear), allows additional A'-movement like long-distance focalisation in (17). Moreover, as reported in Lee and Yip (To appear), HyR in Cantonese and Vietnamese may co-occur with short A'-movement in the embedded clauses.

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- (17) ngay ca sách, **anh ta** s [là *t* cũng không oc *t*]
 even at.all book 3SG.M fear [COMP *t* also not read *t*]
 ‘It seems that he does not even read books.’ Focalisation + HyR

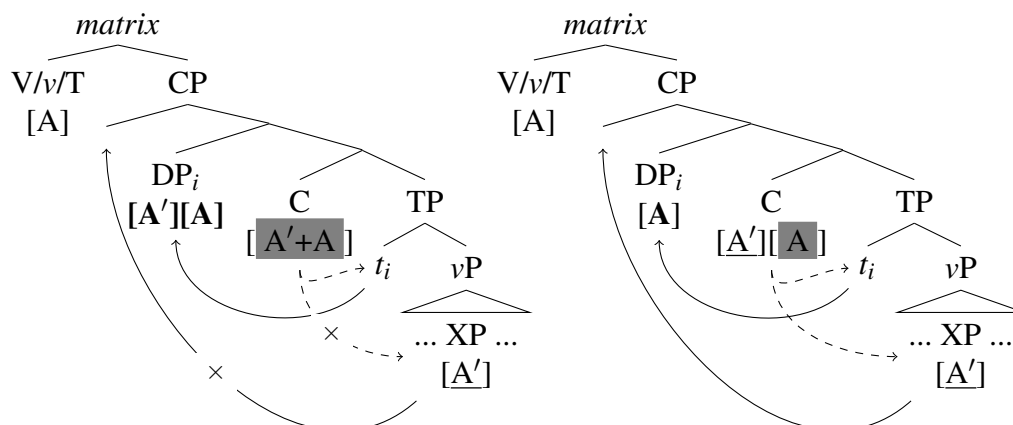
The same can be observed in Mongolian HyR to object and focalisation (18).⁴

- (18) Buuz-iig bol Nara [**Dorj(-iig)** *t* id-sen gej] khel-sen.
buuz-ACC TOP Nara.NOM [**Dorj(-ACC)** *t* eat-PST COMP] say-PST
 ‘The buuz, Nara said that Dorj ate.’ Focalisation + HyR (Fong 2019:28)

4. Analysis: feature (in)dependence on composite probes

We suggest that the typological correlation in (9) can be captured by the (in)dependence of features on composite probes outlined in Sect. 2 in a straightforward fashion. The core idea is that Dependent Probing of [A][A′] features bleeds further A′-movement, whereas Independent Probing of [A] frees up [A′] for additional A′-movement, as schematized below:

- (19) a. Dependent Probe: *extra A′-mvt b. Independent Probe: ^{OK}extra A′-mvt



Before proceeding, three basic assumptions of our analysis are in order. (i) **Locality**: CP in CCA constitutes a phase such that all movement must pass through the phasal edge (*contra* a defective CP approach).⁵ (ii) **Multi-Spec**: Multiple specifiers are allowed (Chomsky 2001). (iii) **Feature Splitting**: On the higher copy in a movement chain, only the features being probed in that dependency are visible to further operations (Obata and Epstein 2011). That is, for a DP that undergoes pure A′-movement, only [A′] is visible on it; for a DP that undergoes mixed A′/A movement, both [A][A′] are visible.

⁴While space limits us to list examples from all the independent probing languages, relevant examples of CCA with additional A′-movement are reported in the literature: Brazilian Portuguese (Kobayashi 2020), Zulu (Halpert and Zeller 2015), Uyghur (Asarina and Hartman 2011), Passamaquoddy (Bruening 2001).

⁵We also assume with Van Urk and Richards (2015) that agreement with a phase solely is not enough to deactivate/“unlock” its phasehood. That is, in languages where agreement with CP is a pre-requisite for CCA (e.g. Zulu, Halpert 2019; Cantonese and Vietnamese, Lee and Yip To appear), the CCA.DP still moves via the CP phasal edge.

4.1 Dependent Probing vs. Independent Probing

In Dependent Probing languages, embedded C has a feature matrix [A'+A] where the two features are *dependent* (e.g. [uEv+uφ/ACC] in Romanian, Alboiu and Hill 2016) and must probe together for the same Goal that carries both features.⁶ As in (19a), [A'] participates in CCA in addition to [A], resulting in the discourse-bound interpretation of the CCA.DP; and simultaneously, halting the Probing of [A'] after the CCA formation. Hence, the ban on additional A'-movement is correlated with the semantic restrictions on CCA.DPs.

In Independent Probing languages, on the other hand, embedded C has a feature matrix [A'][A] where the two features are *independent* of each other (e.g. [uEv][uD] in Cantonese, cf. Lee and Yip To appear). As in (19b), [A] is the only feature required for forming CCA, and [A'] needs not to participate in it (though it can, see Sect. 4.2). In cases where [A'] is not involved, CCA.DP does not receive a discourse-bound reading, and, meanwhile, [A'] is free to target a different Goal, allowing another A'-dependency. In this way, the absence of semantic restrictions is correlated with the possibility of additional A'-movement.⁷

4.2 Conjoined probing of Independent Probes

Our analysis also makes predictions on Independent Probing languages. First, while the [A'] on an Independent Probe is able to probe separately, it can also target the same Goal carrying [A'][A] features and probe conjointly with the [A]. An example is given in Cantonese (20a), which involves HyR of an embedded focused subject from the phasal CP edge (cf. (20b)) to the matrix. The derivation is similar to Dependent Probing depicted in (4a).⁸

- (20) a. **Lin** **taaigungsi** tengman [t̄ gamnin t*(dou) m-paai faahung]
even big.company hear [t̄ this.year t*(also) not-distribute bonus]
 'It is heard that even big companies did not distribute bonuses this year.'
Cantonese HyR of embedded focus
- b. tengman [**lin** **taaigungsi** gamnin t*(dou) m-paai faahung]
 hear [**even big.company** this.year t*(also) not-distribute bonus]
 'It is heard that even big companies did not distribute bonuses this year.'

Second, importantly, we predict that conjoined probing in Independent Probing languages, just like Dependent Probing languages, should bleed an additional A'-movement. This is expected if [A'] on the embedded is halted due to a prior CCA formation that involves both [A'][A] features. This prediction is borne out in Cantonese: relativisation of the embedded object is disallowed with HyR of the embedded focused subject in (21).

⁶Dependent Probing can be implemented in different ways, either by conjunctive satisfaction (Scott 2021, Deal 2022), or by limiting searching domain (Branan 2021).

⁷Under the assumption that only the probed features are visible to further operations (Obata and Epstein 2011), CCA and A'-movement can happen in either order. This is because the additional A'-moved elements, even if they are DPs, only carry [A'] but not [A] as visible features, and do not trigger A-Minimality effects.

⁸Other Independent Probing languages like Vietnamese, Uyghur (Asarina and Hartman 2011), and Zulu (Halpert and Zeller 2015) also allow such conjoined probing and permit CCA with focalised/*wh*-elements.

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- (21) *Di [**Lin** **taaigungsi** tengman [t̄ gamnin t̄ dou m-paai t̄]] ge *faahunɡ*
those [**even** **big.Co.** hear [t̄ this.year t̄ also not-distr. t̄]] MOD *bonus*
'The bonuses x such that it is heard that even big companies did not distribute x
this year.' *Relativisation + HyR of embedded focus

5. Conclusion

To sum up, we have uncovered a systematic cross-linguistic variation in CCA, which is accounted for by the parameterized *(in)dependence of features* on composite probes. In Dependent Probing languages, where [A'+A] on embedded C must probe together, the presence of semantic restrictions on CCA.DPs correlates with the ban on additional A'-movement simultaneously to CCA. In Independent Probing languages, where [A']/[A] on embedded C may probe separately, the lack of semantic restrictions on CCA.DPs correlates with the allowance on additional A'-movement. Furthermore, when [A']/[A] on an Independent Probe probe *conjointly*, additional A'-movement is also blocked. The findings suggest that (in)dependence is one dimension along which features may be organized (Scott 2021, Lohninger et al. 2022), resonating with a recent body of literature on how feature hierarchies constrain syntactic operations (Coon and Keine 2021, Branan 2021, Deal 2022).

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