
Information Packaging in Japanese

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ABSTRACT. In Sections 1 and 2 we examine the information structure of Japanese through the lens of Vallduví's theory of information packaging. Certain Japanese phenomena lead us in Sections 3 and 4 to consider two extensions to the standard filecard model that are inspired by centering theory and database design.

1 Japanese *wa* as a link marker

In Vallduví's analysis of Catalan [Val92, Val93], the overt material in the core clause is interpreted as focus; ground elements are detached from the core, with links (filecard addresses) conveniently detached to the left and tails (record pointers) to the right. If it turned out that Japanese also manifested neat grammatical distinctions for link, focus, and tail, then this fact would be a strong argument in support of Vallduví's model.

Previous authors [Wat89, Hey94, Kai98, PY98] (whose insights we build on here) take as their point of departure the assumption that the postpositional topic marker *wa* is the link marker in Japanese. This is reasonable as a first approximation; however, in this section we argue that *wa*-marking is in fact neither a necessary nor sufficient condition for linkhood.

Thematic and contrastive *wa*

It is well known that *wa*-marked phrases sometimes carry a contrastive rather than thematic reading [Kun73, Chap. 2]. A number of properties distinguish the two uses. Thematic *wa* is restricted to discourse-salient referents, while contrastive *wa* can mark new information. A thematic *wa*-phrase goes unstressed, while a contrastive *wa*-phrase receives prominent intonation. A sentence is restricted to at most one thematic phrase, which if present appears in sentence-initial position; however, multiple elements within the sentence can be marked *in situ* with contrastive *wa*. And while the topic generally falls outside of the scope of negation, phrases marked by contrastive *wa* are interpreted as the target of negation [McG87]. Thus the properties of thematic *wa* match up nicely with Vallduví's characterization of the link. Contrastive *wa*-phrases which contain new information and receive prominent intonation should be considered focus elements.

Two thematic *wa*'s

Presumably, the claim that *wa* marks linkhood is a claim about the thematic *wa* and not the contrastive one. However, some instances of thematic *wa* cannot be interpreted as link instructions. Shibatani [Shi90, Sec. 11.2] makes a distinction between two types of preposed *wa* sentences. The first represents a true categorical judgment [Kur72] about the entity which is the *wa*-marked topic. An example is sentence (1.1a), in which the topicalized element *kyou* ('today') denotes an entity about which a property is asserted.

- (1.1) a. *Kyou-wa* [*tenki-ga* *ii*].
today weather-SUBJ is good
'Today is such that the weather is good.'
- b. *Kyou-wa* [*boku-ga* [e] *ryouri-siyou*].
today I-SUBJ cook-do-VOL
'Today, I will cook.'

The second type, exemplified by (1.1b), Shibatani calls the 'stylistic' topic construction. Here an element is *wa*-marked and fronted, but the effect is of mild emphasis rather than true topicalization. Shibatani suggests that a true topic construction like (1.1a) is base-generated, while the stylistic topic results from movement of the fronted element out of the predicate, as indicated in (1.1b). In any case, the phenomenon includes examples like the *wa*-marked PPs in (1.2) and (1.3).

- (1.2) *Hatizi-made-wa* *matu*
8 o'clock-until wait
'(I will) wait until eight o'clock.'
- (1.3) *Tookyoo-kara-wa* *John-ga* *kita*.
Tokyo-from John-SUBJ came
'From Tokyo, John came.'

Whatever the *wa*-marked phrases in (1.1b)-(1.3) denote, clearly they are not links. Heycock [Hey94], who takes the function of *wa* to be link-marking, notes that one could perhaps argue instead that Japanese has a particular syntactic position (e.g. SpecCP) that is specialized for links, as in Catalan. A Japanese sentence is restricted to at most one thematic *wa* phrase, including the 'stylistic' one. It follows that if the thematic *wa* phrase in fact occupies a particular syntactic position, then this slot may well be specialized for links, but not exclusively, since it can sometimes host nonlinks as well.

The particle *ga*

The Japanese postpositional particle *ga* is often viewed as a nominative case marker; it marks the grammatical subject of a sentence.¹ Whether the subject of a sentence is marked by *wa* or *ga* conveys a variety of information about it, and this contrast has received much attention [Kur72, Kun73, HMI87, Wat89]. One difference is that *ga* is often used to introduce new discourse entities. Thus *ga* is often a focus marker, analogous to the A accent [Jac72] in English. Heycock [Hey94] also gives an example where a *ga*-phrase acts as a tail rather than a focus element. However, she takes *wa*-marking to be a necessary condition for linkhood and therefore rules out the possibility of *ga*-phrases behaving as links.

Under Vallduví's analysis, all preverbal subjects of Catalan are interpreted as links. In English, subjects with B accent are links. It seems to us that despite the association of *ga* with new information, Japanese subjects marked with *ga* are sometimes links too.² For example, a request for information about John is naturally answered with *John-wa kaetta* ('John left'), but could also be answered with *John-ga kaetta* ('What John did was leave'). The latter response might be used when leaving is seen as a surprising or unlikely activity for John. Shibatani [Shi90, Sec. 11.2] gives other examples where *ga* is used instead of *wa* in a discourse to present the events as discrete scenes, as if each event were witnessed afresh. In cases like these, *ga*-marked phrases are sentence-initial ground elements whose corresponding filecards are the only plausible destinations for the propositions expressed by the sentences in which they occur. We conclude then that not all tokens of *wa* are link markers, and not all links are marked by *wa*.

2 Other facets of Japanese information structure

Prosody

In Japanese, intonational prominence (like word accent) is realized mainly through pitch. The locus of Japanese sentence accent falls on the leftmost accentable constituent of the accent phrase. The sentence accent generally marks the point of information focus or contrastive prominence in the utterance. In the unmarked case, the location of the accent is determined by the syntax; a sentence whose sentence accent deviates from the unmarked pattern generally receives a contrastive or narrow focus reading.

The examples in (1.4) illustrate the effect of sentence accent falling on different constituents in the sentence. Here we use boldface to mark morae that are slightly above the intonation baseline (e.g. word accents), and upper-case

¹For a restricted class of transitive predicates *ga* marks the object.

²This is not a contradiction, since it is sometimes possible for the link to point to a new address, thereby simultaneously creating and pointing to that filecard [Val92].

Most accentable	\longleftrightarrow	Least accentable
<i>ga</i> -phrases/wh-words	nouns adverbs <i>wa</i> -phrases	verbs/particles

Table 1.1: Scale of accentability [Mat84]

to mark the higher-pitch sentence accent, corresponding roughly to the A accent in English.

- (1.4) a. **KE**sa **okasi-o** **tabete-imasita.**
 this morning cakes-OBJ eating-was
 ‘I was eating cakes THIS MORNING.’
- b. **kesa** o**KAsi**-o **tabete imasita.**
 ‘I was eating CAKES this morning.’
- c. **kesa okasi-o** **TABETE IMAsita.**
 ‘I was EATING cakes this morning.’

Utterance (1.4b) bears unmarked sentence accent and hence allows both broad and narrow focus readings. That is, it can be interpreted as an answer to the general query “What were you doing this morning?” as well as “What were you eating this morning?” On the other hand, (1.4a) and (1.4c) can only be interpreted as narrow-focus answers to specific queries. All three examples in (1.4) can also receive contrastive focus interpretations.

Japanese exhibits what Vallduví calls ‘plastic’ intonational structure—the prosodic structure of the sentence is fairly malleable to the information packaging needs of the speaker. Matsunaga [Mat84] observes however that certain syntactic categories are more likely to receive sentence accent than others, as illustrated in Table 1.1.³ Not surprisingly, the focus-accentability of thematic *wa* phrases, which refer anaphorically to already salient entities, is lower than that of *ga* phrases which usually refer to new information.

Constituent ordering

The ordering of constituents within a Japanese sentence is another parameter that conveys aspects of its information structure. In Japanese (as in many ‘free’ word order languages), given information tends to precede new information within the sentence. Prague school approaches [SHP86] assume that elements exhibit a fine gradation of ‘communicative dynamism’ from left to right across the sentence. Many approaches assume explicit syntactic slots for topic and focus—topic is assumed to occupy a leftmost position detached from the rest of the sentence, with the default focus position just to the left of the verb (cf. Hungarian, Basque, Turkish).

³Note that prosodic focus can be so narrow that even individual particles receive sentence accent (Table 1.1).

Japanese enjoys freer word order than English, although SOV is the preferred, unmarked configuration and the verb must be sentence-final. Grammatical functions are identified by overt, postpositional case particles such as *ga* (subject) and *o* (object). Although an object may precede the subject, the presence of more than one object in front of the subject sounds unnatural—thus Japanese “scrambling” phenomena are sometimes characterized as “fronting” (implying less freedom). The fronting of a constituent tends to mildly emphasize it and increase its salience.

The post-verbal construction

As noted above, the verb must come at the end of a sentence and cannot be scrambled. However, in colloquial speech certain constituents can sometimes appear after the main verb, as illustrated in (1.5).

- (1.5) *Mou yonda, kono hon.*
already read, this book
'I've already read this book.'

The pragmatic effect is that the postposed phrase seems to suggest some kind of afterthought. The intonation pattern also implies this, since the verb is uttered with the usual sentence-final falling intonation, and the postposed element is added quickly with low, flat intonation.

Kaiser suggests that Japanese uses this construction as a means of overtly marking tails [Kai98]. Her analysis is attractive in that it meshes with Vallduví's identification of right-detached elements in Catalan with tails. Furthermore, the characterization of the postposed phrases as afterthoughts implies that they would be good candidates for helpful *update-replace* instructions, i.e. tails. Unfortunately, however, the comparison with Catalan again falls somewhat short. First, as Kaiser acknowledges, the postposed elements are not always hearer-old. Secondly, *wa*-marked topics, ostensibly links, can be postposed. Kaiser excludes the possibility of non-initial links in principle; however, examples of non-sentence-initial links are found in many languages [EV94, p. 50], so this assumption might be questioned.

Conclusion

Having surveyed the major information packaging phenomena of Japanese, we compare them to the corresponding features of English and Catalan in Table 1.2. This table is intended to complement similar crosslinguistic charts in [EV94]. As we argued, however, the fit of the Japanese entries in Table 1.2 is not always a comfortable one. While the particle *wa* is generally associated with the link, the association is not exclusive in either direction; similarly, while the postverbal construction often hosts tails, nontails can be postposed as well.

	English	Catalan	Japanese
Intonation	plastic	nonplastic	plastic
Word order	links optionally front	ground detached	flexible, given→new
Focus	A-accent	A-accent, core clause	A-accent, default preverbal slot
Link	B-accent, often initial	left-detached, unaccented	<i>wa</i> -marked, sentence-initial, unaccented
Tail	non-link	right-detached	non-link, optionally right-detached

Table 1.2: Crosslinguistic comparison

In the next two sections we consider some extensions to the standard filecard model which are motivated by certain facts about Japanese as well as theory-internal considerations. We warn that this subsequent material is somewhat speculative and is not intended to provide a full account of the material covered in Sections 1 and 2.

3 Information packaging and centering

Weak pronominals, including English unaccented pronouns as well as clitic pronominals and zero pronouns in Catalan, are “inert as far as information packaging is concerned” [EV94]. For example, in the focus-tail utterance $[[(\textit{But he's}) \textit{NOT}_F] \textit{dead}_T]$, the weak pronoun *he* appears within the focus phrase by default, but in fact is not associated with any instruction type. For link-less utterances it is assumed that the locus of update is either inherited from earlier in the discourse or is somehow recoverable from context.

In Japanese, the ubiquity of zero pronouns means that constituents that would be part of the ground if expressed overtly are frequently omitted, resulting in a large percentage of utterances that are mostly or entirely focus. This raises a question about how the information in highly underspecified Japanese utterances is in fact ‘unpacked’ by the hearer: given impoverished instructions, how is the locus of update to be selected?⁴

One approach to this “missing link” problem is suggested by the centering discourse processing model [GJW95]. Centering and information packaging are inherently compatible: both models keep track of the entities mentioned in a discourse, and both view the sentence as providing a function from an input information state to an output state. We propose a natural

⁴Heycock [Hey94] proposes that for sentences with stage-level predicates, an implicit Davidsonian event argument could be interpreted as the link. Portner and Yabushita [PY98] also consider this approach but note some problems with it.

point at which to integrate these two compatible models: the identification of the locus of update of an utterance U_i with U_i 's preferred center Cp .⁵ Note that for sentences with *wa*-marked links, one would expect the link to become the preferred center anyway, since topic takes the highest position in the Japanese *Cf* ranking hierarchy [Kam85, WIC94]. For link-less utterances, the *Cp* would provide the file clerk with a useful (but defeasible) heuristic about which card to select.

As Dekker and Hendriks [DH94] point out, given Vallduví's notion of the current locus of update, the tools are in place for determining pronominal reference within the information packaging system. An integrated approach would seem to offer an enriched model in which both information update and pronoun resolution are accounted for.⁶

4 A closer look at the file system

What the file clerk points to

A problem arises in Vallduví's system when the link represents a property or a relation, as in (1.6).

- (1.6) a. *Dare-ga siawase desu-ka*
 Who-SUB happy COP-Q
 'Who is happy?'
- b. *Noriko-da.* c. *Siawase-nano-wa Noriko da.*
 Noriko-COP happy-NOMIN Noriko-COP
 'Noriko.' 'It is Noriko who is happy.'

An alternative to the all-focus response (1.6b) is (1.6c), whose information structure can be preserved in the English rendering by it-clefting. In either case, what filecard did the hearer's file clerk select after the utterance of (1.6a) for the addition of this information, and how was the update performed? The only active card involved seems to be the one standing for Noriko.

In order to account for such cases, a system is needed in which the clerk can point to properties. To provide this, we suggest a modification of Vallduví's metaphor of the filecard system to one closer to a *relational*

⁵Due to lack of space we must assume familiarity with centering concepts like the backward-looking (*Cb*), forward-looking (*Cf*) and preferred (*Cp*) centers, and the basic discourse transition relations. Hoffman [Hof98] also considers the packaging/centering interface, but seems to identify the locus of update with the *Cb*, not the *Cp*. The distinction becomes important during a RETAIN transition between utterances U_i and U_{i+1} , where $Cb_{i+1} = Cb_i$ but $Cb_{i+1} \neq Cp_{i+1}$. If an element e is introduced via a link in U_{i+1} , then e becomes the new *Cp* (sentence topic), but not the *Cb* (discourse topic).

⁶The first author and his colleagues are working on an implementation of this approach in the form of a Japanese spoken dialogue system [FAM98].

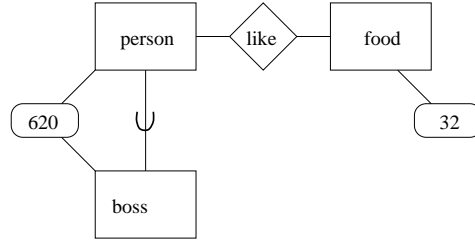


Figure 1.1: The president hates the Delft china set

database [Ull82]. Here we will use only a common high-level description language of such databases, viz. the ER (Entities and Relationships) model introduced in [Che76].

Figure 1.1 illustrates some of the basic conventions of the ER model: Names of sets of individuals (*entities*) are enclosed in rectangles, *relationships* between entity sets in diamonds. The connecting lines indicate that the *hate* relationship holds between certain *persons* and *objects*. *Attributes*, written in ovals, associate values from some domain directly with single entities or relationships. Where the mapping from the values to the entities or relations is a function, the attribute is a *key*. Each entity is assigned its *primary key* (PK), which uniquely identifies it (this role is played by arbitrary, but unique numbers in the figure). In this way, an individual’s primary key is “scattered” throughout the objects representing its properties and the relationships it participates in.⁷

For the discourse in (1.6), then, suppose that *happy* is an entity set, standing for a set of (1-tuples of primary keys of) persons. Then (1.6b) is felicitous only if the file clerk already holds the address of this entity set. When encountering (1.6b), it adds the key belonging to *Noriko* to the set. If the file clerk had been pointing to a different location, incompatibility or miscommunication would have resulted. (1.6c) is slightly more robust in this last respect. It can lead to a successful update even if the file clerk is pointing to some other location than that of *happy*. Here the *wa*-marked phrase (link) directs the file clerk to the *happy* table, where *Noriko*’s primary key is added.

What the file clerk is

The file clerk is often depicted as something that moves about in the file system and points to cards. For example, consider (1.7).

⁷Instances of entities or relationships can then be represented as *tuples* of PK values, i.e. sequences of length n for n -ary relations. The tuples are encoded as rows in tables (whose columns correspond to *roles*), which make up the database.

- (1.7) a. *Katyou-wa osusi-o dou sita?* b. *Tabetano.*
 boss-TOP sushi-OBJ how did-DO-Q ate
 ‘What did the boss do to the sushi?’ ‘He ate it.’

Here the file clerk is sent to a record for sushi on the card for the boss, and the information that the former ate the latter is added. But this is not the end of the update: a hypercard-style pointer to the boss card must be added to the sushi card as well [Val94]. Thus the record, though entered on only one filecard,⁸ ends up equally visible from both locations. This system is claimed to be more “efficient” than one where the record is written on all the filecards. This is true with respect to the number of times the information is written; however, as Hendriks and Dekker note [HD96], in Vallduví’s model the file clerk still has to make new moves as the number of arguments grows.

¿From another (equivalent) perspective, the file clerk can be viewed as a variable holding addresses. Moving around then corresponds to changing its value. In (1.8b) this variable seems to keep track of more than one location:

- (1.8) a. *Katyou-wa kinou kaetta.*
 boss yesterday left
 ‘The boss left yesterday.’
 b. *Kyou-wa nokoru.* c. *Kyou-wa kayoubi-da.*
 today stay today Tuesday-COP
 ‘Today he’s going to stay.’ ‘Today is Tuesday.’

In (1.8b), *kyou-wa* is used contrastively (against *kinou*). In filecard terms, *katyou* remains the locus of update, but a new record is indicated on that filecard. Contrast this with (1.8c), a true topic construction, where *katyou* is replaced by *kyou* as the locus of update. In both cases, *kyou-wa* is instructing the clerk to point to the location of *today*; however, in (1.8b), *katyou* remains the locus of update (and the *Cp* of the centering theory discussed in Section 3). It appears that (1.8b) somehow involves two addresses; that is, the clerk points to both *katyou* and *kyou* (replacing *kinou*) simultaneously.

Here we illustrate how a single database update can produce the same result as in the traditional filecard model. We identify the stage at which information packaging is relevant with the *interface* where database operations are prepared. In the case of example (1.8), the file clerk values on the

⁸Portner and Yabushita [PY98, p. 120–7] suggest that there is in fact a real asymmetry that Vallduví’s system accounts for. They note that a discourse entity *e* is more readily picked out with information that was previously attributed to *e* when *e* was a *wa*-marked topic, i.e. when this information was updated on *e*’s filecard specifically. Presumably symmetrical update systems like Heim’s and DRT (and the one we propose here) cannot capture this asymmetry. We cannot discuss their data here; while they are interesting, they involve very subtle judgments in which the information packaging account must be carefully weighed against competing pragmatic explanations.

left are used to build the database instructions on the right (here using SQL syntax):

- (1.9) a. $\langle \textit{Leave}, b, y \rangle \mapsto \text{insert into L values b, y}$
 $b_1. \langle \textit{Leave}, b, t \rangle$
 $b_2. \langle \textit{Stay}, b, t \rangle \mapsto \text{insert into S values b, t}$

Line (1.9 b_1) shows the result of processing *kyou-wa* in (1.8b). The argument y is replaced with t in the file clerk settings (recall that changing this value amounts to moving the file clerk to the location of *kyou*). The key b corresponding to *katyou* remains the underlying topic and is reused from the clerk for this instruction. Finally, the focused element *nokoru* is inserted into the SQL expression, producing the final instruction in (1.9 b_2).⁹

Conclusion

To sum up the ideas in this section: The file clerk variable is a tuple holding addresses of both entities and relationships. As the interface to the knowledge store (seen here as a relational database), the clerk, equipped with centering-style heuristics, is charged with keeping track of the discourse context while generating database update instructions.

This picture is not incompatible with proposals for replacing the filecard metaphor with DRSs [DH94]. As Engdahl and Vallduví observe [EV94], filecards play a role similar to that of DRT’s discourse referents, although the former have no equivalent to the latter’s semantics of embedding. In addition, the file system has the clerk variable, which can assist in what in expositions of DRT is usually called “finding a suitable antecedent.”¹⁰ An integrated discourse model might use something akin to a DRS which objectifies properties and relations similarly to the ER formalism and has an additional layer of structure to represent the file clerk.

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⁹The reader may have noticed that file clerk values of the form $\langle R, x, y \rangle$ are reminiscent of the *infons* of situation semantics. This connection might be a promising object for further study.

¹⁰To be sure, the analogy has its limits: Besides making discourse referents available, a major aim of DRT is to predict when they are *inaccessible*. Vallduví’s theory makes no attempt to explain the same set of data.

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