Psych verbs in Japanese: Inchoativity and boundary types [☆]

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Abstract

Psych(ological) verbs pose a problem to theories about argument realization that assume a uniform and universal mapping between semantic relations and syntactic configurations. A number of attempts try to explain variation in argument structure in terms of the aspectual differences, assuming that the argument realization of a predicate is a reflection of the temporal properties of the predicate to some extent. However, it is challenging to classify psych verbs into any of Vendler's four aspectual classes because of the "inchoativity" of these verbs. In this study, we take the notion of 'boundary' and its different types as relevant semantic components to describe the internal temporal structure of predicates. We demonstrate that Japanese psych verbs are not aspectually homogeneous but include different types of inchoatives. Accordingly, we propose that the argument realizations of psych verbs can be ascribed to the types of the 'boundary' (i.e. left boundary, right = left boundary and its explicitness/implicitness) the predicates denote.
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1. PSYCH VERBS PUZZLE AND THE NOTION OF 'BOUNDARY'

1.1. Psych verbs puzzle

Psych verbs are those that denote a mental state or a change of mental state, e.g. *fear, like, frighten,* and *please* in English, and they are often characterized by the same pair of thematic roles, Experiencer and Stimulus

(or Theme).[1] However, some verbs express the Experiencer argument as the subject (hereafter ExpSubj verbs, see (1a)), and others lexicalize it as the object (ExpObj verbs, see (1b)). This poses a problem for theories of argument structure that assume a uniform and universal mapping between semantic relations and syntactic configurations.[2] That is to say, psych verbs are associated with a particular pair of thematic roles, but they do not lexicalize them as uniformly as expected.

(1)	a.	The children {like/hate/fear/…} ghosts.	[Experiencer, Stimulus]
	b.	Ghosts {please/disgust/frighten/…} the children.	[Stimulus, Experiencer]

In a cross-linguistic view, the problem seems more puzzling since many languages involve different types of morphosyntactic phenomena that correlate with the semantic properties of the predicates. In Spanish, for instance, there are Experiencer-Nominative verbs (e.g. *odiar* 'to hate'), as in (2a), Experiencer-Dative verbs (e.g. *gustar* 'to please'), as in (2b), and Experiencer-Accusative verbs (e.g. *asustar* 'to frighten'), as in (2c). Many verbs in the last type present the accusative-dative case alternation for the Experiencer argument, as shown in (2c). Moreover, there are reflexive psych verbs, most of which derive from ExpACC verbs with the clitic *se* (e.g. *asustarse* 'to get frightened'), as in (2d).

(2)	a.	*Ella*	*odia*	*eso*.			[ExpNOM verb]
		she	hates	that			
		'She hates that.'					
	b.	*A*	*ella*	*le*	*gusta*	*eso*.	[ExpDAT verb]
		to	she	DAT	pleases	that	
		'That pleases her (She likes that).'					
	c.	*Eso*	*la/le*	*asustó*.			[ExpACC verb]
		that	ACC/DAT	frightened			
		'That frightened her/That was frightening for her.'					
	d.	*Ella*	*se*	*asustó*	*de*	*eso*.	[Reflexive Psych Verbs]
		she	SE	frightened	of	that	
		'She got frightened of that.'					

In Japanese, there are two classes of ExpSubj verbs, *nikumu* 'to hate' type verbs and *odoroku* 'to get surprised' type verbs, and they differ in the case marking of their stimulus objects (see 3a and 3b). The former mark the object by the accusative marker *-o* while the latter mark the object by *-ni*.[3] There are also some verbs that mark their object either by *-o* or by *-ni* (e.g. *kanasimu* 'to be sad', *yorokobu* 'to become pleased'), as in (3c). Moreover, there are ExpObj causatives (e.g. *odorok-ase-* 'to surprise'). They are derived from *odoroku* 'to get surprised' type ExpSubj verbs, as shown in (3d).

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[1] *Experiencer* is "a participant who is characterized as aware of something" (action or state) but who is not in control of it (Andrews, 1985:8, Dowty, 1989:69). *Stimulus* is a participant that "causes some emotional reactions or cognitive judgments in the Experiencer" (Dowty, 1991:579, following Talmy, 1985). *Theme* is "a participant which is characterized as changing its position or condition, or as being in a state or position" (Andrews, 1985:8, Dowty, 1989:69), although, when used with psych predicates, *Theme* refers to the content or object of the described mental state. In this study, we use *Stimulus* as a label that designates the non-Experiencer argument of psych verbs except where the quoted source favours other designations such as Theme (e.g. Belletti and Rizzi, 1988; Grimshaw, 1990, among others).

[2] Such as *Universal Alignment Hypothesis* (Perlmutter and Postal, 1984) and *Uniformity of Theta Assignment Hypothesis* (Baker, 1988).

[3] The particle *-ni* can mark different types of elements: indirect object (i.e. dative case or 'to'), location (i.e. 'at, in'), direction (i.e. 'to'), purpose (i.e. 'to, for'), passive agent (i.e. 'by'), etc. For convenience, we gloss the particle *-ni* as *NI* in this study unless its use is easily identifiable.

(3)	a.	*Kanojyo-ga*	*kare-o*	*nikumda.*	[ExpSubj-*O* verb]
		she-NOM	he-ACC	hate.PST	
		'She hated him.'			
	b.	*Kanojyo-ga*	*sore-ni*	*odoroita.*	[ExpSubj-*NI* verb]
		she-NOM	that-*NI*	get surprised.PST	
		'She got surprised by that.'			
	c.	*Kanojyo-ga*	*sore {-o/-ni}*	*yorokonda.*	
		she-NOM	that {-ACC/-*NI* }	get pleased.PST	
		'She felt happy about/because of that.'			
	d.	*Sore-ga*	*kanojyo-o*	*odorok-ase-ta.*	[ExpObj causatives]
		that-NOM	she-ACC	get surprised-CAUS-PST	
		'That surprised her.'			

A number of studies have addressed the problem posed by psych verbs to preserve the hypotheses of uniform and universal mapping between semantic relations and syntactic realizations of arguments. The earlier works provide syntactic transformational accounts (Belletti and Rizzi, 1988, cf. Postal, 1971) on the assumption that the thematic roles are the same across psych verbs. On the other hand, the later works claim that psych verbs are not aspectually (Grimshaw, 1990) or thematically (Pesetsky, 1995) homogeneous because of the causativity of certain verbs and that such semantic divergence causes different syntactic realizations.

According to Belletti and Rizzi (1988), psych verbs have a uniform θ(theta)-grid [Experiencer, Theme], where the Experiencer is the individual experiencing the mental state and the Theme is the content or object of the mental state. However, there are three classes of psych verbs in Italian: (i) *temere* 'to fear,' (ii) *preoccupare* 'to worry,' and (iii) *piacere* 'to please.' They propose that, while the subject of ExpSubj verbs (i.e. (i)) is an inherently external argument, the subject of ExpObj verbs (i.e. (ii) and (iii)) originates in the internal position and then undergoes a movement to the external position. In other words, ExpObj verbs are unaccusatives. However, there is a difference between (ii) *preoccupare* class and (iii) *piacere* class: the former is an inherent accusative case assigner ('ExpACC verbs'), whereas the latter is an inherent dative case assigner ('ExpDAT verbs'). Their unaccusative analysis of ExpObj verbs significantly impacted the study of psych verbs, mainly because it seemed to account for some syntactic peculiarities associated with these verbs.

According to Grimshaw (1990), ExpObj verbs such as *frighten* and ExpSubj verbs such as *fear* are associated with the same set of thematic relations, but they differ from each other in the aspectual dimension. She argues that argument structure is a representation of the prominence relations determined by the thematic and the aspectual properties of the predicates. Thematic prominence is provided via thematic hierarchy: (Agent (Experiencer (Goal /Source /Location (Theme)))), while aspectual prominence corresponds to the causal hierarchy: (Cause (other (…))) (Grimshaw, 1990:24). The Theme argument of ExpObj verbs is what causes a change of psychological state in the Experiencer. Thus it appears as the subject since the aspectual prominence is more decisive than the thematic one for subject selection.

Pesetsky (1995), on the other hand, argues that ExpObj verbs differ from ExpSubj verbs in their thematic roles because ExpObj verbs are morphological causatives that embed an ExpSubj predicate. The subject of ExpObj verbs is a Causer of emotion, the object of ExpSubj verbs is assigned a different role, Target or Subject Matter (T/SM) of emotion, and the subject selection is realized conforming to a thematic hierarchy containing these roles: Causer > Experiencer > T/SM (Pesetsky, 1995: 59). He argues that ExpObj verbs in English are bimorphemic, consisting of a phonologically null causative morpheme and a bound root that corresponds to an ExpSubj predicate: *depress*: [[√*depress*$_v$]*CAUS*$_v$] (√*depress* = 'be (become) depressed').

Even though there are some debatable points in each of these proposals, these three works still provide guidelines for studying psych verbs. Belletti and Rizzi's (1988) account is based on the view that all psych verbs are characterized by the same pair of thematic roles, i.e. Experiencer and Theme, while Grimshaw's (1990) account suggests that psych verbs are thematically the same but differ in the aspectual dimension and Pesetsky's (1995) account claims that psych verbs differ even thematically because of causativity. The significant turn between the earlier works (e.g. Belletti and Rizzi, 1988) and the later works (e.g. Grimshaw, 1990; Pesetsky, 1995) is that the syntactic variations observed with psych verbs would not be problematic for theories of argument realization if psych verbs were semantically homogeneous.

Assuming that argument realizations are projections of certain semantic information stored in the lexicon (Grimshaw, 1990; Levin and Rappaport Hovav, 2005; and many others), the variations in the argument realizations could be

ascribed to specific semantic differences between the predicates. Especially there are many attempts to explain variation in argument structure in terms of the aspectual differences between the predicates. However, the proposals for the aspectual classification of psych verbs vary from author to author (Croft, 1986, 1993; Dowty, 1991; Grimshaw, 1990; Arad, 1998; Van Voost, 1992; Pylkkänen, 2000, among others). For this paper to support the fundamental idea that argument realizations are ascribed to aspectual differences between the predicates, the following section will summarize some notable studies on the aspectual classification of psych predicates.

1.2. Aspectual analyses of psych verbs

There are different proposals for the aspectual classification of psych verbs. Dowty (1991:580), following Croft (1986), asserts that ExpSubj verbs are stative, while ExpObj verbs can be either stative or inchoative. Grimshaw (1990) proposes ExpObj verbs are causatives, complex events consisting of a process and a change of state (i.e. Vendler's (1967) accomplishments). Croft (1993) also considers ExpObj verbs as causatives in terms of a 'causal chain.' There are also arguments that psych verbs do not vary in lexical aspect: Arad (1998) argues that psych verbs are stative, and Van Voorst (1992) regards all classes of psych verbs as achievement predicates. Pylkkänen (2000) claims that ExpSubj and ExpObj verbs are not opposing the stativity/causativity distinction because there are stative ExpObj causatives in Finnish.

Grimshaw (1990) proposes that ExpSubj verbs (e.g. *like, fear*) are stative, while ExpObj verbs (e.g. *please, frighten*) are nonstative causatives, and therefore accomplishments, because, at the time, it was widely assumed that accomplishments are causatives. This tradition came from the decompositional analysis of aspectual classes, where accomplishments are distinguished from the other classes in event complexity. According to Dowty (1979), stative predicates are semantically primitive, and the other aspectual classes can be decomposed into a stative predicate plus a small set of abstract predicates such as DO (agentivity), BECOME (definite change of state) and CAUSE (causation). He analyzed accomplishments as having the logical structure 'φ CAUSE ψ,' where φ and ψ are sentences containing DO or BECOME. Therefore, while he considered achievements as BECOME ϕ ('single definite change of state'), e.g. *Bill died*: BECOME¬[Bill is alive], he represented accomplishments as ψ CAUSE [BECOME ϕ] ('complex definite change of state'), e.g. *John killed Bill*: [[John did something] CAUSE [BECOME¬[Bill is alive]]]. However, later studies revised the plausibility of this 'accomplishments = causative' view. For instance, some accomplishments are not causative, e.g. *John drove a car from Boston to Detroit,* and some causatives are not accomplishments, e.g. *The clowns walked the elephants around in a circle {for/#in} five minutes* (Filip, 2011). Moreover, the notion of causativity should be separated from the notion of aspect (Pylkkänen, 2000; see below for the details of her proposal).

Croft (1993) also asserts, from a different perspective, that ExpSubj verbs are purely stative while ExpObj verbs are causative. More precisely, the Experiencer in ExpSubj verbs is characterized as "simply being in a mental state regarding the Stimulus," whereas the Stimulus in ExpObj verbs "causes the Experiencer to enter the mental state" (Croft, 1993:56). According to him, languages may have different types of psych verbs: (i) 'stative mental verbs,' e.g. *like*, *be surprised at*; (ii) 'mental activity verbs,' e.g. *think (about)*, *wonder (about)*; (iii) 'causative mental verbs,' e.g. *please*, *surprise*; and (iv) 'inchoative mental verbs,' e.g. *get angry (with).* Assuming that linguistic processes such as subject-object selection, surface case assignment and verbal voice can be accounted for by the cognitive conceptualization of events as 'causal chains,' he shows how the causal chain associated with each class of psych verbs predicts their subject-object selection. However, the subject-object selection of stative mental verbs is not universally predictable because it is difficult to specify any causal chain for stative predicates.

There are also opinions that psych verbs do not vary in aspectual class. For instance, Van Voorst (1992) argues that psych verbs are not states, activities, or accomplishments but are achievements. First, he proposes that there are four classes in psych verbs: (I) From action verb to psych verb, e.g. *He struck me as rather odd*; (II) Psych verbs with an intentional subject, e.g. *The clown tried to amuse me*; (III) Psych verbs with a non-intentional subject, e.g. *The airplane crash upset me a lot*; (IV) Psych verbs of the dislike-type, e.g. *We all detested the dirty streets in that area* (Van Voorst, 1992:66–67). He argues that psych predicates are not stative because they describe eventualities. Therefore, unlike other stative predicates as in (4), the four classes of psych verbs can appear in the pseudo-cleft construction, as shown in (5a-d), respectively.

(4)		*What the class did was matter a lot.
(5)	a.	What these wars did was strike me as very futile.
	b.	What he did was amuse me intensely.
	c.	What the play did was amuse me.
	d.	[?]What I did was dislike these meals intensely.

<div align="right">(Van Voorst, 1992:78–79)</div>

Van Voorst claims that psych verbs are not accomplishments, either, according to the interpretation obtained in the context with the adverb *almost.* With accomplishment verbs, the adverb *almost* presents ambiguity between two readings, 'fail to begin' and 'fail to end', as shown in (6c), while with the other aspectual classes, only one reading is possible. This ambiguity is a reflection of the event complexity of accomplishments. That is, accomplishment verbs describe complex events that consist of a process and a change of state, and the adverb *almost* can scope over each of these subevents. In the case of psych verbs, none of the four classes are accomplishments because when modified by *almost*, they can only have the interpretation that the situation in question failed to begin, as in (7a-d), respectively.

(6)	a.	These reports almost mattered to us.	'fail to begin'
	b.	He almost walked.	'fail to begin'
	c.	He almost built a castle.	'fail to begin' or 'fail to end'
	d.	They almost noticed me in the corridor.	'fail to begin'
(7)	a.	These remarks almost struck me as odd.	'fail to begin'
	b.	He almost amused me.	'fail to begin'
	c.	These events almost amused me.	'fail to begin'
	d.	They almost admired him because of his talents.	'fail to begin'
			(Van Voorst, 1992:70)

Psych verbs are not activities, either, due to the effect of the individuation (or 'quantization') of direct objects. Some activities can become accomplishments when the object is quantized. For instance, the verb *drink* with a mass noun describes an atelic event (i.e. activity), e.g. *He drank red wine {*in 15 minutes/for two hours}*; while with a quantized object, the verb phrase becomes telic (i.e. an accomplishment), e.g. *He drank a bottle of red wine {in 15 minutes/ *for two hours}.* The *almost* test mentioned above also detects the aspectual change from an activity to an accomplishment, as shown in (8). The four classes of psych verbs on this test are not activity predicates since they do not behave as accomplishments even with quantized objects, as in (9a-d), respectively.

(8)	a.	He almost drank red wine.	'almost started'
	b.	He almost drank a bottle of red wine.	'almost started' or 'almost finished'
(9)	a.	These things almost troubled the man.	'almost began'
	b.	These circumstances almost worried my sister.	'almost began'
	c.	That family reunion almost worries his uncle.	'almost began'
	d.	They almost admired him after his latest concert.	'almost began'
			(Van Voorst, 1992:71–72)

Taking these test results, Van Voorst (1992) concludes that psych verbs are more like achievements. Note, however, that his "achievements" refer to inchoative predicates that describe the beginning of a state, such as *notice.*

Arad (1998), on the other hand, claims that verbs can be "psych" only on a stative reading. In other words, all verbs or uses that are psychological are stative. According to her, a verb can have three different readings that are characterized by the combinations of the semantic features of 'agentivity' and 'change of state, as below:

(10)	(i)	agentive reading	[+Agent, +Change of state]	(e.g. 11a)
	(ii)	eventive reading	[-Agent, +Change of state]	(e.g. 11b, c)
	(iii)	stative reading	[-Agent, -Change of state]	(e.g. 11d)
(11)	a.	Nina frightened Laura {deliberately/to make her go away}.		
	b.	Nina frightened Laura {unintentionally/accidentally}.		
	c.	{The explosion/The noise/the thunderstorm} frightened Laura.		
	d.	John/John's behaviour/Nuclear war frightened Nina.		

(Arad, 1998:3-4)

Arad (1998) defines the stative reading as follows: "something inherent to the Stimulus triggers a particular mental state in the Experiencer" or "the Experiencer is at a specific mental state as long as she perceives the Stimulus (or has it on her mind)" (Arad, 1998:4). She extends this to the idea that the Stimulus in the stative reading is an inherent part of the mental state, while the Stimulus in the agentive and eventive readings is instead an Agent or Causer, which is not part of the mental state but merely brings it about.

Pylkkänen (2000) argues that ExpSubj verbs and ExpObj verbs do not oppose in terms of the stativity/causativity distinction; she claims that there are indeed stative ExpObj causatives in Finnish. According to her, Finnish displays two classes of ExpSubj verbs, stative and nonstative, as in (12a) and (13a), respectively. A morphological difference between them is that the nonstative ones involve the inchoative morpheme -stu. Moreover, stative ExpSubj verbs mark their objects in the partitive case, while nonstative ExpSubj verbs mark their objects in the elative case. Regarding ExpObj verbs in this language, they are morphologically causative because they are formed from ExpSubj verbs by suffixing the causative morpheme -tta. Both stative and nonstative classes of ExpSubj verbs can form ExpObj causative counterparts, as in (12b) and (13b).

(12)	a.	*Mikko*	*inhoa-a*	*hyttysi-ä.*	Stative
		MikkoNOM	find disgusting-3SG	mosquitos-PAR	
		'Mikko finds mosquitos disgusting.'			
	b.	*Hyttyset*	*inho-tta-vat*	*Mikko-a.*	Causative
		mosquitosNOM	find disgusting-CAUS-3PL	Mikko-PAR	
		'Mosquitos disgust Mikko.'			
(13)	a.	*Mikko*	*viha-stu-I*	*uutisi-sta.*	Inchoative
		MikkoNOM	anger-INCHO-3SG.PST	news-ELA	
		'Mikko became angry because of the news.'			
	b.	*Untiset*	*viha-stu-tti-vat*	*Mikko-a.*	Causative
		newsNOM	angry-INCHO-CAUS.PST-3PL	Mikko-PAR	
		'The news made Mikko become angry.'			

(Pylkkänen, 2000:418)

ExpObj causatives formed from stative ExpSubj verbs are also stative. For instance, neither ExpObj causatives nor ExpSubj verbs pass the telicity test (Pylkkänen, 2000:420-421). If not telic, ExpObj causatives derived from stative ExpSubj verbs are not accomplishments. The fact that there are stative ExpObj causatives in Finnish indicates that stativity and causativity are not opposing notions. She claims that ExpSubj verbs and ExpObj verbs should not be characterized by the stative/causative distinction but rather by the Individual-level/Stage-level stativity distinction (Pylkkänen, 2000:426-428).[4]

In summary, if we separate causativity from aspectual notions, as Pylkkänen (2000) suggests, psych verbs are mostly stative, although some may have an inchoative reading (Croft, 1986; Dowty, 1991); there may be an Individual-level/Stage-level distinction (Pylkkänen, 2000); and a verb can have an agentive or eventive reading other

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[4] Individual-level predicates are those that denote a property that is true throughout the existence of an individual, e.g. *intelligent, altruistic, have long arms,* while Stage-level predicates are those that denote a spatiotemporally delimited property of an entity, e.g. *available, drunk, stand on a chair* (Carlson, 1977; Kratzer, 1995).

than stative one (Arad, 1998). Then, Van Voorst's (1992) argument may sound different. However, it becomes more plausible if his "achievements" refer to inchoative predicates describing a beginning of a state.

Recent semantic analyses on psych verbs have focused more and more on the inchoativity, besides the stativity, of the predicates (Marín and McNally, 2011; Fábregas, et al., 2012; Rozwadowska, 2012, 2020; Willim, 2016; Fábregas and Marín, 2020, among others). Nevertheless, achievements as an aspectual class require careful treatment to describe the aspectual nature of the predicates more successfully. In the next section, we will outline Piñón's (1997) idea about achievements and highlight the notion of 'boundary' and its applicability to semantic analysis of psych verbs.

1.3. 'Boundary' types as relevant semantic components

Achievements are sometimes treated as short accomplishments (for the variety of views on achievements, see Vendler, 1967; Dowty, 1979; Mittwoch, 1988; Moens and Steedman, 1988; and Piñón, 1997, among many others). However, the distinction between accomplishments and achievements is not just a matter of the length of the event duration. This study takes the position that achievements are crucially different from accomplishments in that achievements are truly instantaneous events with no temporal duration. Among studies that defend the same position, Piñón (1997) sees achievements as 'boundary happenings' since they describe the beginning or/and the ending of certain happenings. Applying his proposal, we can posit different types of 'boundary' and subcategories under achievements. In this section, we summarize Piñón's ideas about the semantics of achievements, which will lead us to a better understanding of the aspectual nature of psych verbs.

According to Piñón (1997), events (including states) are divided into those with duration, even a very short one, and those without duration. He calls the former 'happenings' and the latter 'boundary happenings' because the latter usually correspond to the beginning (i.e. left boundary) or ending (i.e. right boundary) of a happening. Therefore, eventualities (Bach, 1981,1986),[5] such as states, activities, and accomplishments are happenings, while achievements are boundary happenings. More precisely, "[a] boundary happening begins (ends) an eventuality of a particular type just in case no eventuality immediately preceding (following) it such that the sum of the two eventualities is of the same type" (Piñón, 1997:289). Note that the beginnings and endings require reference to the type of eventualities they are boundaries of. Beginnings and endings are formally represented as below:

(14)	a.	Beg (inning):=	$\lambda e \lambda e' \lambda P[$Boundary-HappeningI $\wedge$ Eventuality(e') $\wedge$ Left-Boundary(e, e') $\wedge$ P(e') $\wedge \neg \exists e''[e'' \ll e' \wedge P(e'' \oplus e')]]$
		(i.e.	boundary happening e begins eventuality e' of type P)
	b.	End(ing):=	$\lambda e \lambda e' \lambda P[$Boundary-HappeningI $\wedge$ Eventuality(e') $\wedge$ Right-Boundary(e, e') $\wedge$ P(e') $\wedge \neg \exists e''[e' \ll e'' \wedge P(e' \oplus e'')]]$
		(i.e.	boundary happening e ends eventuality e' of type P)
			(Piñón, 1997:289, Marín and McNally, 2011: 491)[6]

If achievements are boundary happenings and there are different types of boundaries, there could be subcategories under achievements depending on the type of the described boundary. For instance, *recognize* in *Anita recognized Peter* describes a "boundary happening that begins in a state happening in which *Anita* recognizes *Peter*" (Piñón, 1997:291), as formalized in (15a). In *Rebecca reached the summit*, on the other hand, Rebecca reaches the summit, and then "the reaching is both the ending of her climb and the beginning of her being at the summit" (Piñón, 1997:291), as described in (15b).

(15)	a.	*recognize*:=	$\lambda y \lambda x \lambda e [\exists e'[Beg(e, e', \lambda e''[Recognize(e'') \wedge Happening(e'') \wedge Experiencer(e'', x) \wedge Theme(e'', y)])]]$
	b.	*reach*:=	$\lambda y \lambda x \lambda e [\exists e'[End(e, e', \lambda e''[Motion(e'') \wedge Happening(e'') \wedge Agent(e'', x) \wedge Goal(e'', y) \wedge \exists e'''[Beg(e, e''', \lambda e''''[Be-On(e'''') \wedge Happening(e'''') \wedge Theme(e'''', x) \wedge Location(e'''', y)])]])]]$
			(Piñón, 1997:291)

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[5] Strictly, Bach's (1981,1986) 'eventualities' include states (e.g. *sit, stand, be in NY, love x*), processes (e.g. *walk*, *push a cart*) and events (e.g. *build x, walk to Baston, recognize, notice, die, reach the top*).

[6] In this study, we adopted Marín and McNally's (2011:491) notation, a slightly simplified version of Piñón's (1997:289), only for the convenience of our analysis of psych verbs.

Based on Piñón's (1997) descriptions of boundary happenings, I roughly schematize their subclasses as below: (i) a boundary happening that is the beginning of a happening (e.g. *recognize*) and (ii) a boundary happening that is the ending of a happening and the beginning of another happening at the same time (e.g. *reach*).

(16)		Boundary happenings:	
	i)	beginning ('left boundary happening'):	
	ii)	ending = beginning ('right = left boundary happening'):	

Consequently, achievements are distinguished from accomplishments for being truly instantaneous events. While accomplishments are events involving a process leading up to an end, achievements lack a process component, but they are specific components of other events. Although both seem to have telicity in some grammatical tests, not all achievements are telic predicates in the same way as accomplishments. If telicity is defined by the presence of a natural endpoint present in a described event, only those that describe the 'ending' of an event could be telic. In other words, among achievements, the 'beginning' type is atelic.

In summary, achievements are boundary happenings that can be divided into subclasses depending on the type of boundary. Taking those boundary types as relevant notions for aspectual studies, we can see the semantic differences between aspectual classes more clearly and offer a more successful account of the linguistic phenomena related to the aspectual nature of psych verbs. Especially the notion of inchoativity defined in terms of left boundary plays an essential role in aspectual studies of psych verbs.

Marín and McNally (2011), for instance, state that Spanish reflexive psych verbs consist of two classes, the *aburrirse* 'to be/become bored' class (e.g. *agobiarse* 'to get/feel overwhelmed,' *angustiarse* 'to get/be distressed,' *avergonzarse* 'to get/feel ashamed,' *confundirse* 'to get/be confused,' *distraerse* 'to get/be distracted,' *entretenerse* 'to get/be entertained,' *interesarse* 'to get/be interested in,' *molestarse* 'to get/be bothered,' *obsesionarse* 'to get/be obsessed,' *preocuparse* 'to get/be worried') and the *enfadarse* 'to become angry' class (e.g. *asombrarse* 'to be amazed,' *asustarse* 'to get frightened,' *cabrearse* 'to get really mad,' *enfurecerse* 'to get furious,' *enojarse* 'to get annoyed,' *excitarse* 'to get excited,' *indignarse* 'to become indignant,' *mosquearse* 'to get irritated,' *ofenderse* 'to get offended,' *sorprenderse* 'to be surprised'). Both classes are inchoative predicates, but the former is stative, and the latter is genuinely punctual.

Drawing from Piñón's (1997) terminology for event ontology, Marín and McNally (2011) propose that *aburrirse* verbs are predicates that describe a state happening that includes the beginning of the state, while *enfadarse* verbs are predicates that describe a left boundary happening, i.e. the beginning of a state. More precisely, the difference between these two classes is that the event *e* that *aburrirse* class verbs describe is the sum of a left boundary happening *e′* and a state happening *e″*, as described in (17a, 18a). In contrast, the event *e* of *enfadarse* class verbs is just the left boundary of a state happening *e′*, as shown in (17b, 18b), and therefore they are truly punctual.

(17)	a.	*aburrirse*:=	$\lambda x\lambda e\exists e',e''[Beg(e', e'', \lambda e'''[bored(e''') \wedge Happening(e''') \wedge EXPERIENCER(e''', x)]) \wedge e = (e''\oplus e')]$
	b.	*enfadarse*:=	$\lambda x\lambda e\exists e'[Beg(e, e', \lambda e''[angry(e'') \wedge Happening(e'') \wedge EXPERIENCER(e'', x)])]$

<div align="right">(Marín and McNally, 2011:492)</div>

(18)	a.	*aburrirse* 'to be/become bored' class:	
	b.	*enfadarse* 'to become angry' class:	

Moreover, the fact that these psych predicates are inchoative, but they are atelic, suggests that inchoativity does not imply telicity. Marín and McNally (2011) define that inchoative predicates are those that describe "an eventuality which necessarily is or includes the beginning of some happening," while telic predicates are those that "necessarily make reference to the ending of some happening" (Marín and McNally, 2011:491).

So far, we have recapitulated Piñón's (1997) proposal of distinction in achievements by boundary types, and we have taken Marín and McNally's (2011) study about Spanish reflexive psych verbs as an example of its effective use. In the following sections, we will present different classes of Japanese psych verbs and examine their internal temporal structures to describe the eventualities in terms of types of 'boundary.'

2. PSYCH VERBS IN JAPANESE

2.1. Two classes of Experiencer-Subject verbs

In Japanese, psych verbs are typically expressed in ExpSubj configurations. There are two classes of ExpSubj verbs, which differ in the case marking for the Stimulus argument (Teramura, 1982; Bando, 1996; Bando and Matsumura, 2011; Endo and Zushi, 1993; Matsumura, 1996; Yamakawa, 2004; Shimizu, 2007; Yoshinaga, 2008; Isse, 2008, among others). Some ExpSubj verbs mark their object by the accusative case marker *-o* ('ExpSubj-*O* verbs': e.g. *nikumu* 'to hate'), as in (19a), while others mark their object by *-ni* ('ExpSubj-*NI* verbs': e.g. *odoroku* 'to get surprised'), as in (19b). Some verbs can mark their object either by *-o* or by *–ni* (e.g. *kanasimu* 'to be sad', *yorokobu* 'to become pleased'), as shown in (19c).

(19)	a.	*Maki-ga*	*Taro-o*		*nikumda*.	
		Maki-NOM	Taro-ACC		hate.PST	
		'Maki hated Taro.'				
	b.	*Maki-ga*	*kaminari-ni*		*odoroita*.	
		Maki-NOM	thunder-*NI*		get surprised.PST	
		'Maki got surprised by the thunder.'				
	c.	*Maki-ga*	*purezento{-o/-ni}*		*yorokonda*.	
		Maki-NOM	present-ACC/-*NI*		be/get pleased.PST	
		'Maki got pleased about/because of the present.'				

(20)   Japanese ExpSubj verbs:[7]

a. ExpSubj-*O* verbs: *aisuru* 'to love,' *agameru* 'to worship, to adore,' *anadoru* 'to make light of' *ayasimu* 'to suspect,' *ayabumu* 'to fear,' *awaremu* 'to feel pity for,' *hajiru* 'to be ashamed,' *higamu* 'to take a jaundiced view of,' *hossuru* 'to want,' *itamu* 'to lament, to mourn,' *itsukusimu* 'to cherish,' *itou* 'to dislike, to avoid,' *itoosimu* 'to love,' *ibukasimu* 'to suspect,' *ibukaru* 'to suspect,' *imu* 'to abhor,' *iyasimu* 'to hamble,' *kirau* 'to dislike,' *konomu* 'to like,' *kuiru* 'to regret,' *kuyamu* 'to repent,' *mederu* 'to admire,' *nageku* 'to grieve, to deplore' *natukasimu* 'to miss,' *netamu* 'to envy, to begrudge,' *nikumu* 'to hate,' *nozomu* 'to wish, to desire' *osimu* 'to regret, to spare,' *osoreru* 'to fear,' *sagesumu* 'to despise,' *sinobu* 'to recall,' *sitau* 'to adore,' *sonemu* 'to envy,' *suku* 'like,' *tamerau* 'to hesitate,' *tanosimu* 'to enjoy,' *toutobu* 'to respect,' *utagau* 'to doubt,' *utomu* 'to dislike,' *utonjiru* 'to alienate,' *uyamau* 'to respect,' *uramu* 'to have a grudge against,' *urayamu* 'to envy,' *yaku* 'to be jealous of,' etc.

b. ExpSubj-*NI* verbs: *akireru* 'to be shocked,' *akiru* 'to get bored,' *aseru* 'to be impatient,' *awateru* 'to panic,' *bibiru* 'to be scared,' *hasyagu* 'to frolic,' *hirumu* 'to flinch, to shrink,' *ijikeru* 'to be perverse,' *ikaru* 'to get mad,' *iradatu* 'to get impatient,' *jireru* 'to get impatient,' *komaru* 'to be troubled,' *koriru* 'to learn one's lesson,' *kurusimu* 'to suffer,' *maiagaru* 'to become cheerful,' *mairu* 'to feel beaten,' *mayou* 'to waver,' *megeru* 'to lose hope,' *meiru* 'to get depressed,' *mukureru* 'to get sullen,' *nayamu* 'to be bothered,' *obieru* 'to be scared,' *odoroku* 'to get surprised,' *ogoru* 'to be proud of oneself,' *ojikeru* 'to dread,' *okoru* 'to get angry,' *ononoku* 'to tremble,' *otituku* 'to calm down,' *sirakeru* 'to become chilled,' *syogeru* 'to get depressed,' *tereru* 'to be bashful,' *tomadou* 'to be confused,' *ukareru* 'to be in high spirits,' *urotaeru* 'to be upset,' *kanasimu* 'to be sad,' *yorokobu* 'to be/get pleased,' etc.

The case marking by *-o* or *-ni* varies the interpretation of the Stimulus argument. According to Teramura (1982), Endo and Zushi (1993), and other related works, the *o*-marked objects are interpreted as the Object of Emotion, while most *ni*-marked ones refer to the Cause of Emotion, as shown in (21a) and (21b) respectively. However, as Teramura (1982) noted, there are a few ExpSubj verbs (e.g. *akogareru* 'to yearn for,' *horeru* 'to fall in love with,' *kogareru* 'to long for') whose object is marked by *-ni* but interpreted as Object of Emotion instead of Cause of Emotion, as in (22).

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[7] The verbs listed here are in the nonpast form, a.k.a. 'dictionary form.'

(21)	a.	*Maki-wa*	*sono sirase-o*	*kanasimda*.	Object of Emotion
		Maki-TOP	that news-ACC	feel sad.PST	
		'Maki felt sad about the news.'			
	b.	*Maki-wa*	*sono sirase-ni*	*kanasimda*.	Cause of Emotion
		Maki-TOP	that news-*NI*	feel sad.PST	
		'Maki felt sad because of the news.'			

(22)	*Taro-wa*	*sensei-ni*	*akogareta/ horeta*.	Object of Emotion
	Taro-TOP	teacher-*NI*	yearn.PST/ fall in love.PST	
	'Taro yearned for/ fell in love with his teacher.'			

Notice that this 'Object of Emotion'/'Cause of Emotion' distinction resembles Pesetsky's (1995) 'Target or Subject Matter (T/SM)'/'Causer' distinction. Pesetsky (1995) states that Target of Emotion and Subject Matter of Emotion are generally lumped together under the term Object of Emotion. Note, however, that in Japanese, both Object of Emotion and Cause of Emotion appear as object elements of ExpSubj verbs, whereas Pesetsky's T/SM and Causer were coined to differentiate the objects of ExpSubj verbs (23a, b) from the subjects of ExpObj verbs (24a, b).

(23)	a.	Bill was very angry <u>at the article in the Times</u>.	Target of Emotion
	b.	John worried <u>about Mary's poor health</u>.	Subject Matter of Emotion
(24)	a.	<u>The article in the Times</u> angered Bill greatly.	Causer
	b.	<u>Mary's poor health</u> worried John.	Causer

ExpSubj-*O* verbs and ExpSubj-*NI* verbs differ in the grammatical status of their objects. While the *o*-marked elements are verb-required direct objects, the *ni*-marked ones can be optional postpositional phrases. In a simple test, for instance, the *o*-marked elements are essential for the sentence to be grammatical, while the *ni*-marked ones can be omitted.

(25)	a.	*Maki-ga*	**(Taro-o)*	*nikumda*.
		Maki-NOM	Taro-ACC	hate.PST
		'Maki hated Taro.'		
	b.	*Maki-ga*	*(monooto-ni)*	*odoroita*.
		Maki-NOM	noise-*NI*	get surprised.PST
		'Maki got surprised (at a noise).'		

There is another related piece of evidence that the *ni*-marked elements of psych verbs are optional phrases. In Japanese, case markers and postpositions are indistinguishable because both are particles suffixed to nominal phrases (NPs). Nevertheless, case-marked NPs and NPs with postpositions behave differently in a syntactic phenomenon called 'quantifier floating.' According to Miyagawa (1989a,1989b), a floated numeral quantifier (NQ) and its host NP must c-command each other, just like floated NQs and case-marked NPs do in (26a-b). However, a floated NQ cannot be accepted in (26c-d) because the NP is within a postpositional phrase, and the c-commanding relationship is blocked. Notice that the particle -*ni* in (26b) is a dative case marker, while the same particle in (26c) is a postposition introducing the passive agent. In other words, a *ni*-marked element can be a case-marked object or a postpositional phrase, and only the case-marked one passes the floated NQ test.

(26)	a.	*Paul-wa*	*[hon-o]*	<u>*san-satu*</u>	*yomda.*	
		Paul-TOP	book-ACC	three-CL	read.PST	(CL = classifier)
		'Paul read three books.'				
	b.	*Ruth-wa*	*[ayasii*	*otoko-ni]*	<u>*hutari*</u>	*atta.*
		Ruth-TOP	suspicious	man-DAT	two.CL	meet.PST
		'Ruth met two suspicious men.'				
	c.	**Ruth-wa*	*[[tomodati]-ni]*	<u>*hutari*</u>	*but-are-ta.*	
		Ruth-TOP	friends-by	two.CL	hit-PASS-PST	
		'Ruth was hit by two friends.'				
	d.	**Gail-wa*	*[[bou]-de]*	*ni-hon*	*jyuuji-o*	*tukutta.*
		Gail-TOP	stick-with	two-CL	cross-ACC	make.PST
		'Gail made two crosses with sticks.'				
					(Matsumura, 1996:126)	

Applying this test to the two classes of ExpSubj verbs, the *o*-marked elements allow a floated NQ, as in (27a), whereas the *ni*-marked elements do not, as in (27b). This indicates that the former are case-marked NPs, while the latter are NPs within a postpositional use of -*ni*. That is to say, the *o*-marked objects of ExpSubj verbs are verb-selected arguments, whereas the *ni*-marked elements are adjuncts (for a more detailed discussion, see Matsumura, 1996).

(27)	a.	*Ruth-wa*	*[otoko-o]*	*san-nin*	*nikumda.*	
		Ruth-TOP	man-ACC	three-CL	hate.PST	
		'Ruth hated three men.'				
	b.	**Gail-wa*	*[[ayasii*	*otoko]-ni]*	*san-nin*	*obieta.*
		Gail-TOP	suspicious	man-*NI*	three-CL	be scared.PST
		'Gail was scared of three suspicious men.'				
					(Matsumura, 1996:127)	

Regarding the ExpSubj verbs whose *ni*-marked objects are rather Object of Emotion than Cause of Emotion, however, we could see that they pattern like ExpSubj-*O* verbs. The ellipsis test indicates that their *ni*-marked elements are verb-selected arguments, as shown in (28a), although the same cannot be said in the NQ test, as in (28b).

(28)	a.	*Maki-ga*	**(eiga sutaa-ni)*	*akogareta.*	
		Maki-NOM	movie star-*NI*	long.PST	
		'Maki longed for *(the movie star).'			
	b.	**Maki-ga*	*eiga sutaa-ni*	<u>*hutari*</u>	*akogareta.*
		Maki-NOM	movie star-*NI*	two.CL	long.PST
		'Maki longed for two movie stars.'			

Moreover, there is another grammatical difference between the *o*-marked objects and the *ni*-marked elements regarding passive sentences. The *o*-marked objects can be the subjects of passives, as in (29), while the *ni*-marked elements cannot, as in (30).[8] Regarding the ExpSubj verbs that mark their objects by *-ni* but behave just like ExpSubj-*O* verbs, again, they pattern like ExpSubj-*O* verbs in this test, as shown in (31).

(29)	a.	*Taro-wa*	*tomodachi-o*	*nikum-da*.
		Taro-TOP	friend-ACC	hate-PST
		'Taro hated his friend.'		
	b.	*Tomodachi-wa*	*Taro-ni/-kara*	*nikum-are-ta*.
		friend-TOP	Taro-by/-from	hate-PASS-PST
		'The friend was hated by Taro.'		

(30)	a.	*Taro-ga*	*kaminari-ni*	*odoroita*.
		Taro-NOM	thunder-*NI*	get surprised.PST
		'Taro got surprised by the thunder.'		
	b.	?*Kaminari-wa*	*Taro-ni/-kara*	*odorok-are-ta*.
		thunder-TOP	Taro-by/-from	get surprised-PASS-PST
		Lit: 'The thunder was gotten surprised by Taro.'		

(31)	a.	*Taro-ga*	*sensei-ni*	*horeta*.
		Taro-NOM	teacher-*NI*	fall in love.PAST
		'Taro fell in love with his teacher.'		
	b.	*Sensei-ga*	*Taro-ni/-kara*	*horer-are-ta*.
		teacher-NOM	Taro-by/-from	fall in love-PASS-PAST
		'The teacher was fallen in love with by Taro.'		

Notice also that the passives of ExpSubj verbs can mark the Experiencer complement by *-kara* 'from' (Teramura, 1982). This may suggest that the Experiencer of these verbs can be the source of the described emotional reaction or judgment.

To sum up, Japanese ExpSubj verbs differ in case marking, which interacts with the different thematic interpretations of the Stimulus, 'Object of Emotion' or 'Cause of Emotion,' and which also relates to the different grammatical status of the same participant, verb-selected argument or verb-external adjunct. There are ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') whose *o*-marked element is an argument and expresses Object of Emotion and ExpSubj-*NI* verbs (e.g. *odoroku*

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[8] There are some cases in which the *ni*-marked elements may be accepted for the subjects of passives, but a particular reading is required, as shown below:

a.	*Taro-ga*	*tomodachi-ni*	*odoroita*.
	Taro-NOM	friend-*NI*	get surprised.PST
	'Taro got surprised by that story.'		
b.	?*Tomodachi-wa*	*Taro-ni/-kara*	*odorok-are-ta*.
	friend-TOP	Taro-*NI* / -from	get surprised-PASS-PST
	Lit: 'The friend was gotten surprised by Taro.'		
	(The friend (or what the friend did/how the friend was/etc.) was surprising for Taro)		

'to get surprised') whose *ni*-marked element is an adjunct and expresses Cause of Emotion (except that few verbs such as *akogareru* 'to yearn for' mark their Object of Emotion by *-ni* instead of *-o*).[9]

2.2. Experiencer-Object causatives

Regarding ExpObj verbs in Japanese, they are morphologically derived from ExpSubj verbs by suffixing a causative morpheme *-(s)ase*.[10] However, not all ExpSubj verbs have ExpObj variants. Most ExpSubj-*NI* verbs, including those that alternate between *-o* and *-ni*, appear to form ExpObj causatives productively.

(32)	a.	*Maki-ga*		*kaminari-ni*	*odoroita*. (=19b)
		Maki-NOM		thunder-*NI*	get surprised.PST
		'Maki got surprised by the thunder.'			
	b.	*Kaminari-ga*		*Maki-o*	*odorok-ase-ta*.
		thunder-NOM		Maki-ACC	get surprised-CAUS-PST
		'The thunder surprised Maki.'			

(33)	a.	*Maki-ga*		*purezento{-o/-ni}*	*yorokonda*. (=19c)
		Maki-NOM		present-ACC/-*NI*	be/get pleased.PST
		'Maki got pleased about/because of the present.'			
	b.	*Purezento-ga*		*Maki-o*	*yorokob-ase-ta*.
		present-NOM		Maki-ACC	be/get pleased-CAUS-PST
		'The present pleased Maki.'			

Most ExpSubj-*O* verbs, on the other hand, seem not to produce natural ExpObj variants, as in (34a), although a "regular" causative construction like (34b) below may be tolerable instead.

(34)	a.	**Taro-ga*		*Maki-o*	*nikum-ase-ta*.	
		Taro-NOM		Maki-ACC	hate-CAUS-NPST	
		Intended: 'Taro caused hatred for him in Maki.'				
	b.	(?)*Jiro-ga*		*Maki-ni*	*Taro-o*	*nikum-ase-ta*.
		Jiro-NOM		Maki-DAT	Taro-ACC	hate-CAUS-PST
		'Jiro made Maki hate Taro.'				

Nevertheless, there is an exception: an ExpSubj-*O* verb, *tanosim-* 'to enjoy,' can form an ExpObj variant without problems.

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[9] There are also many psych adjectives (e.g. *ayasii* 'suspicious,' *awarena* 'pitiful,' *hazukasii* embarrassing,' *hosii* 'want,' *itowasii* 'disgusting,' *itoosii* 'love,' 'suspicious,' *imaimasii* 'bloody,' *iyasii* 'humble,' *kiraina* 'hate,' *konomasii* 'pleasant, like,' *kuyasii* 'regrettable,' *nagekawasii* 'deplorable,' *natsukasii* 'nostalgic,' *netamasii* 'enviable,' *nikui* 'hateful,' *nozomasii* 'derirable,' *osii* 'regrettable,' *osorosii* 'terrible,' *sukina* 'like,' *tanosii* 'pleasant, enjoyable,' *toutoi* 'venerable,' *utagawasii* 'doubtful,' *utomasii* 'desagreeable,' *uyauyasii* 'reverent,' *uramesii* 'reproachful,' *urayamasii* 'enviable,' *kanasii* 'sad,' *yorokobasii* 'glad,' etc.) and Japanese preferably employs psych adjectives to express mental states. Psych adjectives are morphologically related to ExpSubj-*O* verbs and not to ExpSUbj-*NI* verbs. This would be another relevant difference between the two classes of ExpSubj verbs to discuss, but we leave this for future studies.

[10] In Japanese, there are different morphemes that produce causative variants from noncausative predicates, e.g. *-su/-seru, -sasu/-saseru,* and *-simu/-simeru* (literary or archaic/colloquial). Few ExpObj causatives end with another causative morpheme than *-(s)ase-*, e.g. *hazukasimeru* 'to humiliate,' *korasimeru* 'to teach a lesson,' *kurusimeru* 'to torment.' It would be interesting to compare the semantics of these different types of causatives, but we leave this for future studies.

(35)	a.	*Maki-ga*		*sono hanasi-o*	*tanosimda*.
		Maki-NOM		that story-ACC	enjoy.PST
		'Maki enjoyed the story.'			
	b.	*Sono hanasi-ga*		*Maki-o*	*tanosim-ase-ta*.
		that story-NOM		Maki-ACC	enjoy-CAUS-PST
		'The story amused Maki.'			

There are exceptions in ExpSubj-*NI* verbs as well. As noted above, there are a few ExpSubj verbs whose *ni*-marked objects are rather interpreted as 'Object of Emotion' than 'Cause of Emotion,' as shown in (36a). Unlike other ExpSubj-*NI* verbs, they seem unable to form ExpObj variants, as in (36b), although, again, a "regular" causative construction may be tolerable, as in (36c). In other words, these verbs behave just like ExpObj-*O* verbs.

(36)	a.	*Taro-ga*	*Hanako-ni*	*akogareta*.	
		Taro-NOM	Hanako-*NI*	long.PST	
		'Taro longed for Hanako.'			
	b.	??*Hanako-ga*	*Taro-o*	*akogare-sase-ta*.	
		Hanako-NOM	Taro-ACC	long-CAUS-PST	
		Intended: 'Hanako caused a longing for her in Taro.'			
	c.	(?)*Hanako-ga*	*Taro-o*	*jibun-ni*	*akogare-sase-ta.*
		Hanako-NOM	Taro-ACC	self-*NI*	long-CAUS-PST
		'Hanako made Taro long for herself.'			

In summary, ExpObj causatives are derived from ExpSubj-*NI* verbs, including those that can mark their objects by -*ni* or by -*o* (e.g. *kanasimu* 'to be sad,' *yorokobu* 'to be/get pleased'). ExpSubj-*O* verbs with one exception, *tanosimu* 'to enjoy,' cannot form ExpObj causatives. Among ExpSubj-*NI* verbs, those whose *ni*-marked objects are interpreted as 'Object of Emotion' instead of 'Cause of Emotion' (e.g. *akogareru* 'to yearn for,' *horeru* 'to fall in love with,' *kogareru* 'to long for') cannot form ExpObj causatives. Given that, only the ExpSubj verbs whose objects are 'Cause of Emotion' seem possible to derive ExpObj causatives.

3. 'BOUNDARY' TYPES OF JAPANESE PSYCH VERBS

3.1. Aspectual analyses of Experiencer-Subject verbs

In this section, we examine the aspectual properties of the two classes of ExpSubj verbs, ExpSubj-*O* verbs and ExpSubj-*NI* verbs, which differ in the case marking of the Stimulus arguments. The literature mentions that ExpSubj verbs in Japanese are not stative but more like activity-class predicates (Mihara, 2004; Yoshinaga, 2008). Nevertheless, we would like to demonstrate here that ExpSubj-*O* and ExpSubj-*NI* verbs are aspectually distinct. ExpSubj verbs are not stative, at least in an ordinary sense, and they may belong to different classes depending on which type of 'boundary' they denote, which is more accurate than classifying them as activity verbs.

First, let us examine the dynamicity/stativity of ExpSubj verbs. The dynamicity/stativity distinction of the predicates can be tested by the (im)possibility of nonhabitual interpretation in the simple present tense in English and Spanish. There is a similar (but slightly different) test in Japanese. In Japanese, the tense marked on verb endings is either past or nonpast.[11] Stative verbs in the nonpast tense -*(r)u* can yield a 'right now' reading, which describes a present situation, as shown in (37a). On the other hand, nonstative predicates in the nonpast tense cannot express a present situation; instead, they describe a future situation, as in (37b), or they have other readings, such as a generic interpretation, as in (37c).

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[11] In a widely accepted view, the verbal ending -*(r)u* is a nonpast tense marker, while -*ta* is a past tense marker; and -*te iru* is a nonpast imperfective aspect marker, while -*te ita* is a past imperfective aspect marker (Kudo, 1995:36).

(37)	a.	*Taro-ga*	*niwa-ni*	*iru*.		Present situation
		Taro-NOM	yard-at	exist.NPST		
		'Taro is in the yard.'				
	b.	*Taro-ga*	*{hasiru /*	*tegami-o*	*kaku /*	
		Taro-NOM	run.NPST	letter-ACC	write.NPST	
		eki-ni	*tuku}*.	*Present situation		
		station-at	arrive.NPST			
		'Taro {will start to run/will write a letter/will arrive at the station}.'				
	c.	*{Inu-wa*	*hoeru /*	*Daiku-wa*	*ie-o*	*tateru /*
		dog-TOP	bark.NPST	carpenter-TOP	house-ACC	build.NPST
		ikerumono-wa	*mina*	*sinu}*.	*Present situation	
		beings-TOP	all	die.NPST		
		'Dogs bark/ Carpenters build houses/ All animate beings die.'				

In this respect, both ExpSubj-*O* verbs and ExpSubj-*NI* verbs are not stative since these predicates in the nonpast tense cannot describe a present situation; for some verbs, even future readings seem not easy to get (in 38a, a future reading sounds natural if the verb is regarded as inchoative and yields a 'begin to' or 'start to' reading).

(38)	a.	*Taro-ga*		*Hanako-o*	*nikumu*.	*Present situation
		Taro-NOM		Hanako-ACC	hate.NPST	
		*'Taro hates Hanako.'/ 'Taro will <u>start to</u> hate Hanako.'				
	b.	*Taro-ga*		*sirase-ni*	*odoroku*.	*Present situation
		Taro-NOM		news-*NI*	get surprised.NPST	
		*'The news is surprising for Taro.'/ 'Taro will get surprised at the news.'				

In addition, the dynamicity/stativity can be examined in relation to the imperfective forms of the verbs. According to Kudo (1995:70), the verb is a dynamic predicate if there is a meaning contrast between the forms with the nonpast -*(r)u* and the nonpast imperfective -*te i-ru*. If not, it is a static predicate. Normally, stative verbs are incompatible with the -*te i-ru* form, as shown in (39a). However, some stative verbs can appear in this form, although there is no major meaning difference between the -*(r)u* forms and -*te i-ru* forms,[12] as in (39b). With dynamic verbs, the -*te i-ru* forms give a progressive interpretation or a result state reading,[13] as in (39c).

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[12] If there were any meaning difference, the state described by the -*te i-ru* variant can be interpreted as more vivid or temporary (Shirai, 2000):

Fujisan-ga	*{mie-ru /*	*mie-te i-ru}*.
Mt. Fuji-NOM	be visible.NPST	be visible-ASP-NPST
'We can see Mt. Fuji/ We can see Mt. Fuji now.'		

[13] For the fundamental proposal, see Kindaichi (1950, 1976). The discussion about the Japanese aspect marker -*te i-* and its multiple interpretations will appear in Author (2023 under review). Briefly put, the multiple interpretations of the aspect marker -*te i-* can be ascribed to the types of the boundary the predicates denote (i.e. left boundary, right=left boundary, right boundary, etc.).

(39) a. *Neko-ga* { *iru* / **i-te i-ru* }. /
cat-NOM be.NPST be-ASP-NPST

Booru-ga { *aru* / **at-te i-ru* }. /
ball-NOM be.NPST be-ASP-NPST

Kare-no koui-wa *syousan-ni* { *ataisuru* / **ataisi-te i-ru* }.
he-GEN behavior-TOP praise-to worth.NPST worth-ASP-NPST

'A cat is in the yard.'/ 'A ball in the yard.'/ 'His behavior is worthy of praise.'

b. *Sore-wa* { *tigau* / *tigat-te i-ru* }. /
that-TOP differ.NPST differ-ASP-NPST

Haha-wa sono *kimono-ga* { *niau* / *niat-te i-ru* }. /
mother-TOP that kimono-NOM suit.NPST suit-ASP-NPST

Soko-ni-wa *seimei-ga* { *sonzaisuru* / *sonzaisi-te i-ru* }.
there-in-TOP life-NOM exist.NPST exist-ASP-NPST

'That is wrong.'/ 'My mother looks good in that kimono.'/ 'There exists life.'

c. *Kodomo-ga* { *hasiru* / *hasit-te i-ru* }. /
child-NOM run.NPST run-ASP-NPST

Sensei-ga *tegami-o* { *kaku* / *kai-te i-ru* }. /
teacher-NOM letter-ACC write.NPST write-ASP-NPST

Kyaku-ga *eki-ni* { *tuku* / *tui-te i-ru* }.
client-NOM station-at arrive.NPST arrive-ASP-NPST

'The child {will run/is running}.'/ 'The teacher {will write a letter/is writing a letter}.'/ 'The client {will arrive/(has arrived and already) is} at the station.'

In this test, ExpSubj verbs are compatible with the *-te i-ru* form, and there is a meaning difference between the *-(r)u* forms and *-te i-ru* forms. ExpSubj-*O* verbs and ExpSubj-*NI* verbs in the *-te i-ru* form describe a present situation (of an ongoing or initiated mental state) that was impossible to be expressed in the nonpast tense according to the previous test.

(40) *Taro-ga* *Hanako-o* { *nikumu* / *nikum-de i-ru* }.
Taro-NOM Hanako-ACC hate.NPST hate-ASP-NPST

'Taro {will start to hate/hates Hanako}.'

Taro-ga *sirase-ni* {*odoroku* / *odoroi-te i-ru* }.
Taro-NOM news-*NI* get surprised.NPST get surprised-ASP-NPST

'Taro {will get surprised/ is surprised} at the news.'

Now, we focus on the (a)telicity and the durativity/punctuality of ExpSubj verbs. Such aspectual distinctions can be captured by the (in)compatibility with certain temporal adverbials. Japanese *-de* 'in' temporal adverbials only indicate the time taken for a (possible) process leading up to the end, unlike English *in*: that is, the *in* adverbial can yield an interpretation like "the time which elapses before the event," e.g. *He recognized her in a minute or so* (Kearns, 2011:160). Therefore, in Japanese, only (telic) predicates that denote a natural endpoint are compatible with *-de,* as shown (41c-d). Durative atelic verbs, on the other hand, are compatible with *-kan* 'for' instead, as in (41a-b).

(41)	a.	*Kodomo-ga*	*jyu-pun {-kan/*-de }*	*niwa-ni*	*ita*.	
		child-NOM	ten-minute -for/-in	yard-at	be.PST	
		'A/The child was in the yard {for/*in} ten minutes.'				
	b.	*Kodomo-ga*	*jyu-pun {-kan/*-de }*	*hasitta*.		
		child-NOM	ten-minute -for/-in	run.PST		
		'A/The child ran {for/*in} ten minutes.'				
	c.	*Kodomo-ga*	*jyu-pun {*-kan/-de}*	*iti-mai*	*e-o*	*kaita*.
		child-NOM	ten-minute-for/-in	one-CL	picture-ACC	draw.PST
		'A/The child painted a picture {#for/in} ten minutes.'				
	d.	*Kodomo-ga*	*jyu-pun {*-kan/-de}*	*eki-ni*	*tuita*.	
		child-NOM	ten-minute-for/-in	station-at	arrive.PST	
		'A/The child arrived at the station {*for/in} ten minutes.'				

Regarding ExpSubj verbs, ExpSubj-*O* verbs are compatible with -*kan* 'for', and not with -*de* 'in,' as in (42). They are durative atelic predicates. ExpSubj-*NI* verbs, on the other hand, are ambiguous on this test. According to the (in)compatibility with the temporal adverbials in question, some verbs are durative atelic (e.g. *nayamu* 'to be bothered'), as shown in (43a), whereas others are telic (e.g. *akiru* 'to get bored'), as in (43b). Moreover, some verbs disallow both -*kan* and -*de* adverbials (e.g. *odoroku* 'to get surprised'), as shown in (43c).

(42)	*Maki-wa*	*Taro-o*	*ni-nen {-kan/*-de}*		*aisita/ nikumda/ osoreta*.
	Maki-TOP	Taro-ACC	two-year -for/-in		love.PST/hate.PST/fear.PST
	'Maki loved/ hated/ feared Taro {for/?in} three years.'				

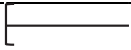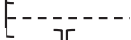| (43)	a.	*Taro-ga*	*souon-ni*	*mikka {-kan/*-de}*	*nayamda*.
		Taro-NOM	noise-*NI*	three days -for/-in	suffer.PST
		'Taro suffered the noise for/*in three days.'			
	b.	*Taro-ga*	*sono eiga-ni*	*jyu-pun {*-kan/-de}*	*akita*.
		Taro-NOM	that movie -*NI*	ten-minute -for/-in	get tired.PST
		'Taro got tired of the movie *for/in ten minutes.'			
	c.	*Taro-ga*	*sono sirase-ni*	*san-pun {#-kan/*-de}*	*odoroita*.
		Taro-NOM	that news-*NI*	three-minute -for/-in	get surprised.PST
		'Taro got surprised at the news *for/?in three minutes.			

Japanese *odoroku* 'to get surprised'-type verbs seem to describe truly punctual events. Punctual predicates in the -*te i-*form typically have an iterative reading (Shirai, 2000). The *odoroku* 'to get surprised'-type verbs have an iterative interpretation in the -*te i-* form, as described below:

(44)	*Taro-ga*	*Maki-no*	*koudou-ni*	*(nijikan)*	*odoroi-te i-ta*.
	Taro-NOM	Maki-GEN	conduct-*NI*	two hours	get surprised-ASP-PST
	'Taro was getting surprised (repeatedly) (for two hours) at Maki's behaviour.'				

Summarizing, ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') are durative atelic predicates, while ExpSubj-*NI* verbs consist of some aspectually different groups: some are also durative atelic (e.g. *nayamu* 'to be bothered') and others are punctual atelic (e.g. *odoroku* 'to get surprised'), although there are some telic ones (e.g. *akiru* 'to get bored/tired').

(45)	ExpSubj verbs:		
	a.	ExpSubj-*O* verbs:	atelic durative
	b.	ExpSubj-*NI* verbs:	
		(i) atelic durative:	*nayam* 'to suffer'-type verbs (e.g. *komaru* 'to be bothered,' *kurusimu* 'to suffer,' *obieru* 'to be scared,' *urotaeru* 'to be upset')
		(ii) atelic punctual:	*odoroku* 'to get surprised'-type verbs (e.g. *ikaru* 'to get angry,' *iradatu* 'to get irritated,' *meiru* 'to get depressed,' *okoru* 'to get angry,' *syogeru* 'to get depressed')
		(iii) telic:	*akiru* 'to get tired'-type verbs (e.g. *akireru* 'to get disgusted,' *koriru* 'to learn a lesson,' *mairu* 'to feel beaten,' *megeru* 'to lose hope,' *sirakeru* 'to become chilled')

In other words, ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') and ExpSubj-NI verbs (e.g. *nayamu* 'to be bothered, to suffer') describe a state happening that may include its beginning. Other ExpSubj-*NI* verbs (e.g. *odoroku* 'to get surprised'), on the other hand, seem to describe the beginning of a state, and therefore they are genuinely punctual. However, another group of ExpSubj-*NI* verbs (e.g. *akiru* 'to get bored') describes the ending of a state that is at the same time the beginning of another state, and hence they are telic predicates. We roughly schematized these aspectual differences between ExpSubj verbs as below:

(46)		a.	ExpSubj-*O* verbs (to be revised. See 50):	
		b.	ExpSubj-*NI* verbs	
			(i)	atelic durative (e.g. *nayamu* 'to be bothered'):
			(ii)	atelic punctual (e.g. *odoroku* 'to get surprised'):
			(iii)	telic (e.g. *akiru* 'to get bored'):

ExpSubj-*O* and ExpSubj-*NI* verbs differ in the case marking for the Stimulus argument. If the former are durative atelic and the latter also include some durative atelic ones (e.g. *nayamu* 'to be bothered'), it would seem that we cannot say that ExpSubj-*O* verbs and ExpSubj-*NI* verbs are aspectually distinct. However, there is an aspectual difference between ExpSubj-*O* and ExpSubj-*NI* verbs. For instance, ExpSubj-*O* and ExpSubj-*NI* verbs behave differently in contexts with reference time modifiers.

In Reichenbach's (1947) terms, a reference time is a time which can be identified from context or certain adverbials, and it provides a reference point to calculate the location of the event time, which is, in turn, the time in which the event occurs or over which the state holds (Kearns, 2011:189). Some adverbials provide a reference time interval for the interpretation of a sentence, and the interpretation varies depending on the eventualities denoted by the sentence. With a reference time adverbial, such as 'tomorrow', a state is regarded as containing the reference time, i.e. [r ⊆ e], while other events are interpreted as being contained within the reference time, i.e. [e ⊆ r]. Regarding those stative predicates that can yield an inchoative reading (e.g. *understand* in English, *saber* 'to know' in Spanish), they appear to manifest an interpretation such as 'the event begins within the reference time', i.e. [the beginning of e ⊆ r].[14]

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[14] Marín and McNally (2011) examine the interpretations of Spanish reflexive psych verbs (e.g. *enfadarse* 'to become angry', *aburrirse* 'to be/become bored') with reference time adverbials to demonstrate that *aburrirse* 'to be/become bored'-type verbs are inchoative predicates that "include obligatory reference to the onset of the state described" (Marín and McNally, 2011:488), in contrast with noninchoative stative predicates (e.g. *estar aburrido* 'to be bored').

a.	*Mañana*	*los*	*estudiantes*	*se*		*aburrirán*	*en*	*clase*.
	tomorrow	the	students	SE		will.be bored	in	class
	'Tomorrow the students will get bored in class.'							
b.	*Mañana*	*los*	*estudiantes*	*estarán*		*aburridos*	*en*	*clase*.
	tomorrow	the	students	will.be		bored	in	class
	'Tomorrow the students will be bored in class.'							
				(Marín and McNally, 2011:489)				

Applying this test to Japanese examples, states (47a) and other events (47b, c, d) with a reference time adverbial, *asita* 'tomorrow', result in having the interpretations [r ⊆ e] and [e ⊆ r], respectively.

(47)	a.	*Maki-wa*	*asita*	*gakkou-ni*	*iru*.		[r ⊆ e]	
		Maki-TOP	tomorrow	school-in	be.NPST			
		'Maki will be in school tomorrow.'						
	b.	*Maki-wa*	*asita*	*gakkou-ni*	*iku*.		[e ⊆ r]	
		Maki-TOP	tomorrow	school-to	go.NPST			
		'Maki will go to school tomorrow.'						
	c.	*Maki-wa*	*asita*	*iti-mai*	*tegami-o*	*kaku*.	[e ⊆ r]	
		Maki-TOP	tomorrow	one-CL	letter-ACC	write.NPST		
		'Maki will write a letter tomorrow.'						
	d.	*Maki-wa*	*asita*	*nihon-ni*	*tuku*.		[e ⊆ r]	
		Maki-TOP	tomorrow	Japan-at	arrive.NPST			
		'Maki will get to Japan tomorrow.'						

Among ExpSubj verbs, ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') would manifest a [the beginning of e ⊆ r] interpretation if they were considered as inchoative predicates, i.e. predicates that involve the beginning of a happening, as shown in (48).

(48)	*#Taro-wa*	*asita*	*Hanako-o*	*nikumu*.	[the beginning of e ⊆ r]
	Taro-TOP	tomorrow	Hanako-ACC	hate.NPST	
	*'Taro will hate Hanako tomorrow.'/ 'Taro will <u>start to</u> hate Hanako tomorrow.'				

ExpSubj-*NI* verbs will also have an [e ⊆ r] interpretation. Thoes ExpSubj-*NI* verbs (e.g. *nayamu* 'to be bothered, to suffer') that patterned alike with ExpSubj-*O* verbs in the previous tests, will manifest a [the beginning of e ⊆ r] interpretation without problem.

(49)	a.	*Taro-wa*	*asita*	*sono mondai-ni*	*nayamu*.	[the beginning of
		Taro-TOP	tomorrow	that problem-*NI*	suffer.NPST	e ⊆ r]
		'Taro will suffer that problem tomorrow.'				
	b.	*Taro-wa*	*asita*	*sono sirase-ni*	*odoroku*.	[e ⊆ r]
		Taro-TOP	tomorrow	that news-*NI*	get surprised.NPST	
		'Taro will get surprised at the news tomorrow.'				
	c.	*Taro-wa*	*asita*	*sono eiga-ni*	*akiru*.	[e ⊆ r]
		Taro-TOP	tomorrow	that movie -*NI*	get tired.NPST	
		'Taro will get tired at the movie tomorrow.'				

That is to say, ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') and some ExpSubj-*NI* verbs (e.g. *nayamu* 'to be bothered, to suffer') resemble those stateve predicates that can yield an inchoative interpretation. However, the [the beginning of e ⊆ r] interpretation is conditional with ExpSubj-*O* verbs. The inchoativity of those predicates may not so explicit as the inchoativity of ExpSubj-*NI* verbs (e.g. *nayamu* 'to be bothered, to suffer') is. To represent this slight difference, we propose that the left boundary (i.e. the beginning of a state) of ExpSubj-*O* verbs may be implicit, while that of ExpSubj-*NI* verbs is explicit, as roughly schematized below:

(50)	a.	ExpSubj-*O* verbs (e.g. *nikumu* 'to hate'):	
	b.	ExpSubj-*NI* verbs	
		(i)	atelic durative (e.g. *nayamu* 'to be bothered'):
		(ii)	atelic punctual (e.g. *odoroku* 'to get surprised'):
		(iii)	telic (e.g. *akiru* 'to get bored'):

So far, we have performed an aspectual analysis of ExpSubj verbs in Japanese. ExpSubj verbs are not ordinary stative verbs. ExpSubj-*O* verbs are durative atelic predicates, and ExpSubj-*NI* verbs include some durative atelic ones, punctual atelic ones, and a few telic ones. More precisely, ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') and some ExpSubj-*NI* verbs (e.g. *nayamu* 'to be bothered') denote a happening that involves a left boundary, as represented in (51a) and (51b(i)) respectively. However, there is a difference in the explicitness of the left boundary. Among other ExpSubj-*NI* verbs, some denote a boundary happening whose boundary is a left one (e.g. *odoroku* 'to get surprised'), as in (51b (ii)), and others that denote a boundary happening whose boundary is simultaneously a left boundary of a state and a right boundary of another state (e.g. *aki-* 'to get bored'), as in (51b(iii)).

(51)	ExpSubj verbs:		
	a.	ExpSubj-*O* verbs:	
		e.g. *nikumu* 'to hate':=	$\lambda y \lambda x \lambda e \exists e', e''[Beg(e', e'', \lambda e'''[hate(e''') \wedge Happening(e''') \wedge EXPERIENCER(e''', x)] \wedge STIMULUS(e''', y)) \wedge e = (e'' \oplus e')]$
	b.	ExpSubj-*NI* verbs:	
	(i)	e.g. *nayamu* 'to be bothered':=	$\lambda y \lambda x \lambda e \exists e', e''[Beg(e', e'', \lambda e'''[bothered(e''') \wedge Happening(e''') \wedge EXPERIENCER(e''', x)] \wedge STIMULUS(e''', y)) \wedge e = (e'' \oplus e')]$
	(ii)	e.g. *odoroku* 'to get surprised':=	$\lambda x \lambda e \exists e'[Beg(e, e', \lambda e''[surprised(e'') \wedge Happening(e'') \wedge EXPERIENCER(e'', x)])]$
	(iii)	e.g. *akiru* 'to get bored':=	$\lambda x \lambda e [\exists e'[End(e, e', \lambda e''[\neg bored (e'') \wedge Happening(e'') \wedge EXPERIENCER(e'', x) \wedge \exists e'''[Beg(e, e''', \lambda e''''[bored(e'''') \wedge Happening(e'''') \wedge EXPERIENCER(e'''', x)])]])]]$

3.2. Aspectual analyses of Experiencer-Object causatives

Now, we examine the aspectual nature of ExpObj causatives. As repeatedly noted before, ExpObj verbs derive from ExpSubj-*NI* verbs. In the section just above, we proposed that ExpSubj-*NI* verbs are divided into three types concerning their aspectual differences. In this section, we intend to verify whether ExpObj causatives formed from these three sub-classes of ExpSubj-*NI* verbs are also aspectually different.

Firstly, let us test the dynamicity/stativity distinction in interpreting the nonpast tense forms. ExpObj causatives in the nonpast tense do not describe a present situation but may have a future reading. This indicates that ExpObj causatives are not stative predicates.

(52)	a.	*Sono uwasa-ga*	*Taro-o*	*nayam-ase-ru.*	*Present situation
		that rumor-NOM	Taro-ACC	be bothered-CAUS-NPST	
		'The rumour will bother Taro.'			
	b.	*Sono kekka-ga*	*Taro-o*	*odorok-ase-ru.*	*Present situation
		that result-NOM	Taro-ACC	get surprise-CAUS-NPST	
		'The result will surprise Taro.'			
	c.	*Sono hanasi-ga*	*Taro-o*	*aki-sase-ru.*	*Present situation
		that story-NOM	Taro-ACC	get bored-CAUS-NPST	
		'The story will bore Taro.'			

Next, what about the (a)telicity and the durativity/punctuality of these verbs? Let us see their (in)compatibility with temporal adverbials. ExpObj causatives are ambiguous according to the temporal adverbial test. ExpObj causatives pattern like their ExpSubj variants, although they also seem to gain some durativity since they become possible or at least more acceptable with -*kan* 'for.'

(53)	a.	*Souon-ga*	*Maki-o*	*mikka {-kan/*-de}*	*nayam-ase-ta.*
		noise-NOM	Maki-ACC	three days -for/in	suffer-CAUS-PST
		'The noise made Maki suffer for/?in three days.'			
	b.	*Taro-ga/Sono sirase-ga*		*Maki-o*	*san-pun {#-kan/?-de}*
		Taro-NOM/that news-NOM		Maki-ACC	three-minute -for/in
		odorok-ase-ta.			
		get surprised-CAUS-PST			
		'Taro/ The news surprised Maki for/?in three minutes.'			
	c.	*Taro-ga/ Sono eiga-ga*		*Maki-o*	*san-pun {#-kan/-de}*
		Taro-NOM/that movie -NOM		Maki-ACC	three-minute -for/in
		aki-sase-ta.			
		get tired-CAUS-PST			
		'Taro/ The movie tired Maki for/in three minutes.'			

Moreover, many ExpObj causatives seem to gain telicity that their ExpSubj variants did not have because they become compatible with -*de* 'in', as in (54b), or more tolerable with it, as in (55b).

(54)	a.	*Taro-ga*		*sono hanasi-ni*	*san-pun{*-kan/??-de}*
		Taro-NOM		that story-*NI*	three-minute -for/in
		syogeta/okotta.			
		get depressed.PST/get angry.PST			
		'Taro got depressed/got angry at that story {*for/*in} three minutes.'			
	b.	*Sono hanasi-ga*		*Taro-o*	*san-pun{-kan/-de}*
		that story-NOM		Taro-ACC	three-minute -for/in
		shoge-sase-ta/okor-ase-ta.			
		get depressed-CAUS-PST/ get angry-CAUS-PST			
		'That story depressed/angered Taro {for/in} three minutes.'			

(55)	a.	*Maki-wa*	*Taro-no kimagure-ni*	*hutuka {-kan/??-de}*
		Maki-TOP	Taro-GEN caprice-*NI*	two days -for/-in
		komatta.		
		be bothered.PST		
		'Maki was bothered by Taro's caprice {for/*in} two days.'		
	b.	*Taro-no kimagure-wa*	*Maki-o*	*hutuka {-kan/?-de}*
		Taro-GEN caprice-TOP	Maki-ACC	two days -for/in
		komar-ase-ta.		
		be bothered-CAUS-PST		
		'Taro's caprice bothered Maki {for/in} two days.'		

Furthermore, ExpObj causatives with durative adverbials can also have an iterative reading, just like their ExpSubj-*NI* counterparts. This indicates that the punctuality of some ExpSubj-*NI* verbs appears to remain in the ExpObj causative variants.

(56)	*Kaminari-ga*	*Taro-o*	*sanjyu-pun-kan*	*odorok-ase-ta.*
	thunder-NOM	Taro-ACC	30-minute-for	get surprised-CAUS-PST
	'The thunders (repeatedly) surprised Taro for thirty minutes.'			

Finally, we would like to see how ExpObj causatives react to reference time modifiers, as we did for ExpSubj verbs in the previous section. ExpObj causatives are compatible with reference time modifiers and have an [e ⊆ r] interpretation. This means that ExpObj causatives describe events and not states.

(57)	a.	*Sono uwasa-ga*	*asita*	*Taro-o*	*nayam-ase-ru.*	[e ⊆ r]
		that rumor-NOM	tomorrow	Taro-ACC	be bothered-CAUS-NPST	
		'The rumour will bother Taro tomorrow.'				
	b.	*Sono kekka-ga*	*asita*	*Taro-o*	*odorok-ase-ru.*	[e ⊆ r]
		that result-NOM	tomorrow	Taro-ACC	get surprise-CAUS-NPST	
		'The result will surprise Taro tomorrow.'				
	c.	*Sono hanasi-ga*	*asita*	*Taro-o*	*aki-sase-ru.*	[e ⊆ r]
		that story-NOM	tomorrow	Taro-ACC	get bored-CAUS-NPST	
		'The story will bore Taro tomorrow.'				

Concluding the remarks of this section, ExpObj causatives maintain the aspectual properties of their ExpSubj variants, although they seem to gain some durativity and telicity. The causativization in ExpObj causatives is an operation to add a happening (i.e. causing event) to the happening or boundary happening that the base verb denotes, as roughly sketched as in (58). Hence, some base happenings or boundary happenings as a whole may become an endpoint of the added happening. Therefore, ExpObj causatives gain durativity and telicity through the derivation from ExpSubj-*NI* verbs.

(58)   ExpObj causatives:

(i) *nayam-ase-* 'to bother'-type:

(ii) *odorok-ase-* 'to surprise'-type:

(iii) *aki-sase-* 'to bore'-type:

Based on the formalizations we proposed for ExpSubj-*NI* verbs in the previous section, the semantics of ExpObj causatives are represented below:

(59)   ExpObj causatives:

(i) *nayam-ase-* 'to bother' type:= λxλe[∃e′,e″,e‴[CAUSE(e‴, e) ∧ STIMULUS (e‴, x) ∧ Beg(e′, e″, λe‴[bothered(e‴) ∧ Happening(e‴) ∧ EXPERIENCER(e‴, x)]) ∧ e=(e″⊕e′)]]

(ii) *odorok-ase-* 'to surprise' type:= λyλxλe[∃e′,e‴[CAUSE(e″, e) ∧ STIMULUS (e‴, x) ∧ Beg(e, e′, λe″[surprised(e″)^Happening(e″) ∧ EXPERIENCER(e″, y)])]]

(iii) *aki-sase-* 'to bore' type: = λyλxλe[∃e′, e‴‴[CAUSE(e‴‴, e) ∧ STIMULUS (e‴‴, x) ∧ End(e, e′, λe″[¬bored(e″) ∧ Happening(e″) ∧ EXPERIENCER(e″, x) ∧ ∃e‴[Beg(e, e‴, λe‴′[bored(e‴′) ∧ Happening(e‴′) ∧ EXPERIENCER(e‴′, y)])])]])]]

4. CONCLUSION

In this study, we conducted an aspectual analysis of Japanese psych verbs. First, we summarized some crucial proposals on the psych verbs puzzle and turned our attention to the notion of 'boundary' and its utility in describing the eventualities of predicates. Then, we examined the aspectual properties of Japanese psych verbs and described them in terms of their boundary types.

Japanese psych verbs are not stative, at least not in an ordinary fashion. ExpSubj-*O* verbs (e.g. *nikumu* 'to hate') are atelic durative inchoatives. ExpSubj-*NI* verbs include (i) atelic durative inchoatives (e.g. *nayamu* 'to be bothered'), (ii) atelic punctual inchoatives (e.g. *odoroku* 'to get surprised'), and (iii) telic predicates (e.g. *akiru* 'to get bored'). These verbs differ in the boundary types the predicates denote. ExpSubj-*O* verbs are predicates that describe a state happening that may include an implicit left boundary, ExpSubj-*NI* verbs are predicates that describe (i) a state happening with an explicit left boundary, (ii) a left boundary happening, or (iii) a right = left boundary happening. The difference between ExpSubj-*O* verbs and ExpSubj-*NI* verbs is that ExpSubj-*O* verbs are more like stative predicates, while ExpSubj-*NI* verbs are eventive, or that the boundary of ExpSubj-*NI* verbs is more explicit than that of ExpSubj-*O* verbs. It shows that the presence/absence or explicit presence/implicit presence of a boundary may be relevant to argument realization. Regarding ExpObj causatives, they seem to maintain the aspectual properties of their ExpSubj-*NI* variants. However, they also seem to gain some durativity and telicity. A detailed discussion about the Japanese causativization with psych verbs will appear in one of the author's future works.

Psych verbs in Japanese are not stative or aspectually homogeneous. The predicates vary in their temporal properties, and we described them by applying the notion of boundary. The argument realizations of psych verbs can be attributed to the types of the boundary the predicates denote.

Data availability

No data was used for the research described in the article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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