

Michaela Pörn

Psychophysical and Physical Causative Emotion Verbs in Finnish: The Temporal Structure of Causative Emotion Verb + Infinitive 1 -Constructions within Conceptual Semantics

Abstract

The purpose of this article is to illustrate the differences between psychophysical (e.g. *heikottaa*, ‘feel weak’) and physical (e.g. *janottaa*, ‘be thirsty’) causative emotion verbs in Finnish by studying the factors that determine the temporal structure of the causative emotion verb + infinitive 1 -construction. The focus, in other words, is whether the situation expressed by the infinitive 1 verb lasts as long as the situation expressed by the matrix verb, or whether the situation expressed by the infinitive 1 verb precedes or follows the situation expressed by the matrix verb. Moreover, the article shows why clauses such as *Minua janottaa kävellä kotiin* (‘It makes me thirsty to walk home’) do not sound natural in Finnish. It is shown that the temporal structure of a well-formed causative emotion verb + infinitive 1 -construction is determined by the properties of both the infinitive 1 (the aspect of the verb) and the matrix verb (the semantics of the verb). Formal rules of grammar for the temporal structure of causative emotion verb + adjunct -constructions are constructed based on the framework conceptual semantics.

1. Introduction¹

This article deals with the differences between psychophysical and physical causative emotion verbs in Finnish (e.g. *heikottaa*, ‘feel weak’; *janottaa*, ‘be thirsty’) by studying the temporal structure of the causative emotion verb + infinitive 1 -construction. I use the term *infinitive 1* to mean the first infinitive form in Finnish. In traditional Finnish grammar there are morphologically four or five different infinitives (see e.g. Siro 1964; J. Leino 2003: 99–111).

The Finnish causative emotion verbs (fi. *tunnekausatiivi*, see e.g. Siirainen 2001; Pörn 2004, 2007) differ from the curative causatives (fi.

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kuratiivikausatiivit, e.g. *rakennuttaa*, ‘to cause/make to build’) or factitives (the latter term is used in NS, the Modern Finnish Dictionary, see e.g. Kytömäki 1978 and 1989; Paulsen forthcoming), because they are syntactically of special character. The (most) central element in their argument structure is a human entity as the experiencer of the state of emotion that is syntactically not expressed as subject but as object, as *Mattia* in (1):

- (1) *Matti-a* *pelo-tta-a*.
 Matti-PART be.afraid-CAUS-3SG.PRES
 ‘Matti is scared.’

Syntactically the Finnish causative emotion verb may also occur in connection with an element that expresses the cause for the state of emotion. This element can be expressed in the syntax as subject, as *työ* in (2):

- (2) *Matti-a* *pelo-tta-a* *työ*.
 Matti-PART be.afraid-CAUS-3SG.PRES job.NOM
 ‘The job scares Matti.’

The clause in (2) is interpreted as follows: ‘The job causes that Matti feels scared’, i.e. the causing situation is the job, which is expressed in the syntax as subject, whereas the caused situation is the state of emotion, which is expressed in the syntax by the causative emotion verb *pelottaa*, ‘be afraid’.² The temporal structure refers to the relationship in time between the causing and the caused situation.

The cause for the state of emotion or the causing situation can also be expressed as an adjunct clause or a clause complement in a subordinate clause, for example as a *kun* (‘when’)-clause (3), *että* (‘that’)-clause (4) and *infinitive I* complement (5):

- (3) *Matti-a* *pelo-tta-a*, *kun* *hän* *mene-e*
 Matti-PART be.afraid-CAUS-3SG.PRES CONJ-when he-NOM go-3SG.PRES
töi-hin.
 job.PLUR-ILLAT
 ‘Matti is scared **when** he goes to work.’

² Adopting Jackendoff’s (2007) terminology, I use the term *situation* for both events and states.

- (7) *Matti-a heiko-tta-a kävel-lä.*
 Matti-PART be.weak-CAUS-3SG.PRES walk-INF1
 ‘Matti feels weak to walk.’
- (8) **Matti-a jano-tta-a kävel-lä.*
 Matti-PART be.thirsty-CAUS-3SG.PRES walk-INF1
 ‘It makes Matti thirsty to walk.’

This article provides answers to the following questions: (1) What are the factors that determine the temporal structure of the causative emotion verb + infinitive 1 -construction? (2) What rules of grammar do clauses, such as (8), violate? To be able to explain semantically odd clauses, a cognitive grammar model that describes the interface between the lexical conceptual structure and the syntactic structure of the verb is needed. Therefore the theory adopted is conceptual semantics, which is based on formalization in its theory building and treating language as part of an integrated theory of mind (see section 2). The aim of this article is to construct formal rules of grammar for the temporal structure of the causative emotion verb + infinitive 1 -construction.

The organization of the article is as follows: Section 2 is a brief summary of the theory of conceptual semantics as is relevant to the aims of this article. Section 3 shows the differences between psychophysical and physical verbs by explaining the factors that determine the temporal structure of the causative emotion verb + infinitive 1 -construction. Section 4 concludes the article.

2. The Finnish causative emotion verbs in Conceptual Semantics

The goal of the theory of conceptual semantics is to find the optimal way of describing the human cognitive system in a way that explicitly explains the interface between different cognitive systems related to language. Conceptual representation of a word or Lexical Conceptual Structure (LCS) is understood as the level of understanding linguistic information, a link between the linguistic representations such as phonology, syntax and other cognitive domains (spatial, social, haptic knowledge etc.). (See e.g. Nikanne 1997a, 2006.) As Nikanne (1997c: 157–158) points out, it has been more or less a standard assumption in generative grammar that the interface between syntax and conceptual structure is a trivial one-to-one mapping from syntax to semantics, and thus the syntactic structures are assumed to contain plenty of semantic information about event structure

and thematic roles. Because the syntax and the semantics are separate representations, syntactico-semantic linking is a conceptual necessity (see e.g. Chomsky 1993, 1995; Jackendoff 1990; Nikanne 1997c: 158). In the framework of conceptual semantics, however, there is no trivial one-to-one mapping between syntax and conceptual structure. This article deals with the differences between psychophysical and physical causative emotion verbs in Finnish (e.g. *heikottaa* ‘feel weak’; *janottaa* ‘be thirsty’) by studying the temporal structure of the causative emotion verb + infinitive 1 -construction. I use the term *infinitive 1* to mean the first infinitive form in Finnish. In traditional Finnish grammar there are morphologically four or five different infinitives (see e.g. Siro 1964; Leino 2003: 99–111).

In conceptual semantics, each constituent of a sentence is one of the major ontological conceptual categories, such as Thing, Event, State, Action, Place, Path, Property, and Amount (Jackendoff 1990: 22). In Jackendoff (2007) the categories Event and State are revised to appear as Situation. There are two major tiers in conceptual structure: the *thematic tier* and the *action tier* which operate with thematic roles (Agent, Theme, Location etc.) and action roles (Actor, Undergoer). The *action tier* is not relevant for the description of the causative emotion verb + infinitive 1 -construction, and therefore it is left outside this article. The focus is on the structure of the thematic tier.

The thematic roles are determined in the conceptual structure. The lexicon is a part of the linking rule system. The conceptual structure is organized according to three zones that determine the order of the semantic functions (CAUSE, GO, TO, FROM etc.; see e.g. Jackendoff 1990; Nikanne 1990, 1995, 1997b). The organisation of the zones in table 1 is given by Nikanne (1997b: 83):

ZONE 3 (causative zone)	ZONE 2 (thematic zone)	ZONE 1 (location zone)
CAUSE	GO BE	AT, ON, IN, UNDER,... (<i>place</i> -functions)
INCH	STAY EXT CONF	TO, TOWARD, FROM, VIA, AWAY-FROM (<i>path</i> -functions)
	MOVE	
Agent	Theme	Location, Goal, Source, Route

Table 1. Zones and semantic functions.

According to Jackendoff (1990), there are on a separate tier *semantic fields* that describe the cognitive backgrounds in which the events take place. The semantic fields Spatial, Mental, Physical, Temporal, Possessive, Identificational, and Existential are spread over the functions of zones 1 and 2, but not zone 3. Zone 3 has its own semantic fields. The most common ones are Physical, Social and Logical. (For the principles in zone 3, see Nikanne 1990: 100–122.) The state of emotion expressed by the causative emotion verb is described in the Mental, Psychophysical or Physical field (see section 3).

The causative emotion verbs have three potential syntactic arguments, because the LCS of the verb contains three functions: CAUSE, STAY and AT. The lexical function chain (f-chain) of the verb selects an Agent for CAUSE, a Theme for STAY, and a Place for AT. The Place is not expressed in the syntax, but it is implicit (see 10a). The selection is marked with arrows in the formal description.

As mentioned in section 1, the Finnish causative emotion verbs are divided into two groups: compulsorily causative (*kaduttaa* ‘regret’) and optionally causative (*janottaa* ‘be thirsty’) verbs. The LCS of the optionally causative verbs includes an optional CAUSE-function, whereas the LCS of the compulsorily causative verbs includes a compulsory CAUSE-function that has an optionally implicit cause argument. The implicitness index is marked with brackets that express optionality:

event (e.g. *Matti dragged the car down the road*) and *Launching* is a causation that is related to the starting point of the caused event (e.g. *Matti threw the ball into the lake*). Nikanne (1990: 190) gives a formal description of temporal tier relations of the *Entrainment* and *Launching*. The temporal effects on causation in Jackendoff (1990: 138) and Nikanne (1990: 190) are based on situations expressed within matrix clauses. In Nikanne (1997a) the formal description of the temporal tier relations is developed further. Nikanne (1997a: 344) suggests a separate temporal tier, *the constructional T-tier* or *CT-tier* that relates the temporal tier of a matrix clause to that of an adjunct. According to the theory of conceptual semantics, the T-tier of the matrix clause and the T-tier of the adjunct are separately linked to the CT-tier. The CT-tier itself has no exact structure but is a schematic notion. It is characterized only by the correspondence to a linear time course (see Nikanne 1997a: 344–345).

The formal descriptions of the temporal tier relations are developed further in Pörn (2004, 2007). Pörn (2004: 32–36) gives a more explicit formalization of the temporal relationship between the matrix clause and the adjunct clause by defining explicitly the starting point and the final point of each situation (the matrix clause and the adjunct clause). The following abbreviations are used:

- (11) $P_s(M) / (A)$ ‘The starting point of the T-tier of the Matrix clause/Adjunct clause’
and $P_f(M) / (A)$ ‘The final point of the T-tier of the Matrix clause/Adjunct clause’

According to the formalization above the *Entrainment* and *Launching* causations can be described as follows:

- (12) *Entrainment*: $P_s(M) = P_s(A)$ **and** $P_f(M) = P_f(A)$ (‘is equal to’)
 (13) *Launching*: $P_s(M) \geq P_f(A)$ (‘is later than or equal to’) **or** $P_s(A) \geq P_f(M)$ (‘is later than or equal to’)

The option possibility in the *Launching* causation is based on whether the matrix clause or the adjunct clause is interpreted as the causing situation. The formal description made by Pörn (2004) can also be used to describe the causal and temporal relations within the matrix clause (see Pörn 2007). In Pörn (2007: 352–355) the *Entrainment* is formally described as follows: $P_s(\text{zone 2-1}) = P_s(\text{zone 3})$ and $P_f(\text{zone 2-1}) = P_f(\text{zone 3})$. The starting point of the causing situation in zone 3 is equal to the starting point of the caused situation in core zones 2 and 1, and the final point of the causing situation in zone 3 is equal to the final point of the caused situation in core

zones 2 and 1. The *Launching*, on the other hand, is formally described as follows: P_s (zone 2-1) \geq P_f (zone 3), which means that the starting point of the caused situation in zones 2 and 1 is later than or equal to the final point of the causing situation in zone 3. Thus, the causing situation precedes the caused situation.

In section 3 it is shown how the differences between psychophysical and physical causative emotion verbs in Finnish can be explained by studying the temporal structure of the construction with focus on the aspect of the infinitive 1 verb and the semantics of the matrix verb.

3. Causative emotion verb + infinitive 1 -construction

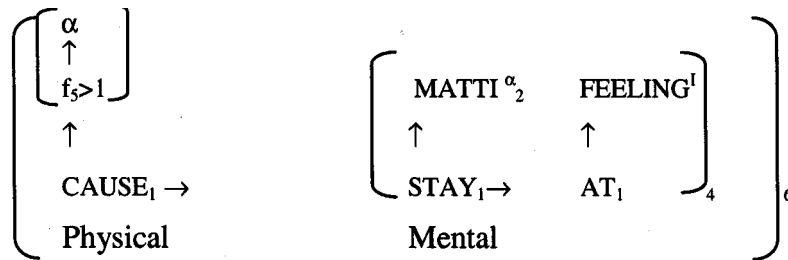
3.1 The aspect of the infinitive 1 verb

The Infinitive 1 complement differs from other subordinated clauses in connection with causative emotion verbs mainly because syntactically it always appears as subject. The infinitive 1 complement must always be linked to the cause argument in the argument structure of the verb. The infinitive 1 complement cannot, like the *kun* ('when')-clause and the *että* ('that')-clause, occur outside the argument structure of the verb, as an adjunct (see Pörn 2004: 130–153). Secondly, the subject referent of the infinitive 1 is the same as the object referent of the whole structure. For example in the clause *Mattia hävettää kävellä* 'Matti feels ashamed to walk', both the subject of the infinitive 1 verb *kävellä* (**Matti** kävelee 'Matti walks') and the object of the matrix verb *hävettää* (**Mattia** hävettää 'Matti feels ashamed') refer to the same person, to *Matti*. In this construction the subject of the infinitive 1 verb always has the same referent as the object of the matrix verb. This is formally described as a binding relation: $X^\alpha \dots \alpha$ means 'X^α binds α' (see 14).

The infinitive 1 complement differs from other subordinated clauses or clause complements also regarding the temporal structure of the clause. In the causative emotion verb + infinitive 1 -construction the situations can on the one hand be simultaneous (*Entrainment*), as in (14). This means that the causing situation, the walking, lasts as long as the caused situation, the feeling of shame. On the other hand, the situation expressed by the matrix verb can precede the situation expressed by the infinitive 1 complement, as in (15): The caused situation, the feeling of shame, precedes the causing situation, the walking. Thus, the feeling of shame, cannot be caused by the **concrete** walking. It is only the **thought** of the upcoming concrete walking

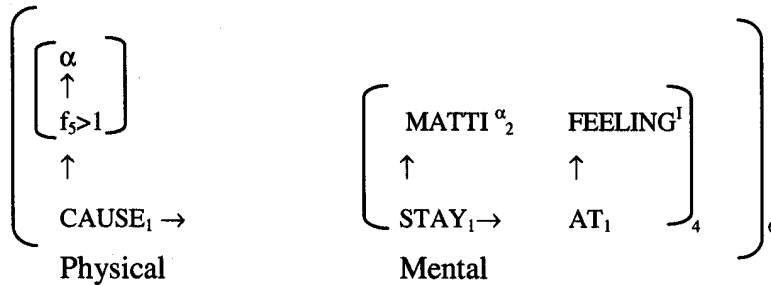
that causes the feeling of shame. In Pörn (2004: 36) this temporal structure is therefore called *Hunch* (fi. *aavistus*) and it is formally described in (15). The starting point of the matrix verb is earlier than the starting point of the *infinitive 1* complement.

- (14) [[*Matti-a*₂ *häve-ttä-ä*]₄ *kävel-lä*₅ *nyt*]₆
 Matti-PART be.ashamed-CAUS-3SG.PRES walk-INF1 now.ADV
 ‘Matti feels ashamed to walk now.’



Entrainment: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)

- (15) [[*Matti-a*₂ *häve-ttä-ä*]₄ *nyt*
 Matti-PART be.ashamed-CAUS-3SG.PRES now.ADV
*kävel-lä*₅ *huomenna*]₆
 walk-INF1 tomorrow.ADV
 ‘Matti feels ashamed **now** to walk **tomorrow**.’



Hunch: P_s (zone 2-1) < P_s (zone 3)

The *Launching* or such a temporal structure where the situation expressed by the infinitive 1 complement precedes the situation expressed by the matrix verb is not possible in the causative emotion verb + infinitive 1 - construction:

- (16) **Matti-a häve-ttä-ä nyt kävel-lä*
 Matti-PART be.ashamed-CAUS-3SG.PRES now.ADV walk-INF1
koti-in eilen.
 home.1SG-ILLAT yesterday.ADV
 ‘*Matti feels ashamed **now** to walk home **yesterday**.’

For example the meaning of the clause *Mattia hävettää nyt se, että hän käveli kotiin eilen* (‘Matti feels ashamed **now** that he walked home **yesterday**’), cannot be expressed by the causative emotion verb + infinitive 1 -construction. The clause is anomalous. The *infinitive 1* complement is syntactically more restricted than other subordinated clauses in connection with causative emotion verbs. This follows from the fact that a non-finite verb, like *infinitive 1*, cannot be conjugated in different tenses, as for example finite verbs in *kun* (‘when’) and *että* (‘that’)-clauses. Thus, the potential temporal structures of the causative emotion verb + infinitive 1 -construction are *Entrainment*: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3) and *Hunch*: P_s (zone 2-1) < P_s (zone 3).

The first question to be answered is: What are the factors that determine the temporal structure of the causative emotion verb + infinitive 1 -construction? In the clauses (14) and (15), the temporal structure is determined by the temporal adverbs *nyt* (‘now’) and *huomenna* (‘tomorrow’). The temporal structure of the clause can also be determined by the aspect of the infinitive verb only. The aspect of the infinitive verb can be either an on-going situation, which is described as a region of time (R), as in the verb *kävellä* (‘walk’) or a punctual situation, which is described as a point of time (P), as in the verb *lähteä* (‘leave’). (C.f. the temporal description of the verb *lähteä* (‘leave’) as a region of time described in Nikanne 1997a: 343–345.)

If the infinitive verb expresses an on-going situation, as *kävellä* (‘walk’) in (17), the situations are strongly interpreted as simultaneous. The causing situation, the walking, lasts as long as the caused situation, the feeling of shame. If, on the other hand, the infinitive verb expresses a punctual situation, such as *lähteä* (‘leave’) in (18), it is more probable that the clause has a reading in which the situation expressed by the matrix verb, i.e. the feeling of shame, precedes the situation expressed by the infinitive 1 complement, i.e. the leaving. The t-tier is as follows: The starting point of the matrix verb is earlier than the starting point of the infinitive verb. Thus, the caused situation precedes the caused. Therefore, it is only the **thought** of the upcoming leaving that causes the state of emotion, the feeling of shame.

I formally describe the principles for the temporal structure of the causative emotion verb + infinitive 1 -construction using the following *Temporal structure* -rule, which is constructed based on the aspect of the infinitive verb.

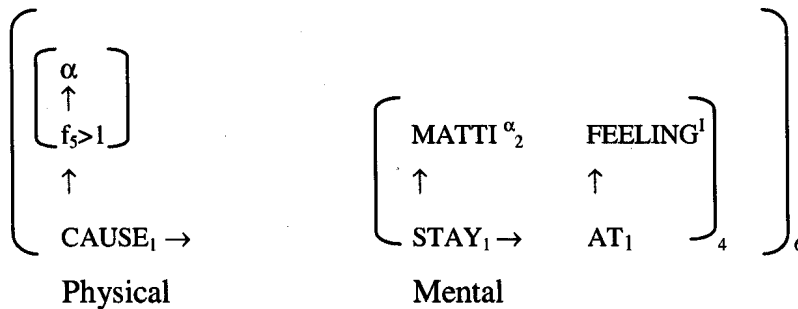
Rule 1: The temporal structure -rule:

If condition (a) holds, then the temporal structure of the clause is *Entrainment*:

(a) T-tier (zone 3) is R

(a) \rightarrow *Entrainment*: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)

- (17) $[[\text{Matti-}a_2 \quad \text{häve-ttä-}ä_1]_4 \quad \text{kävel-lä}_5]_6$
 Matti-PART be.ashamed-CAUS-3SG.PRES walk-INF1
 ‘[[Matti₂ [feels ashamed]₁]₄ to walk₅]₆.’



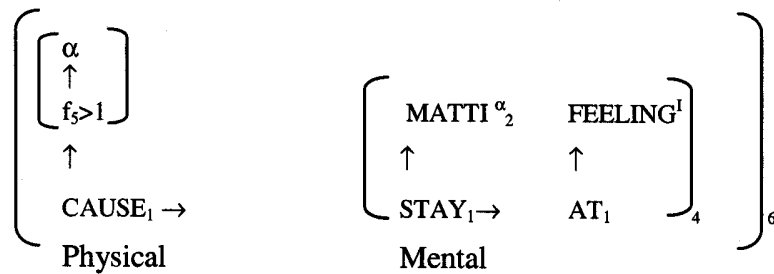
Entrainment: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)

If condition (b) holds, then the temporal structure of the clause is *Hunch*:

(b) T-tier (zone 3) is P

(b) \rightarrow *Hunch*: P_s (zone 2-1) < P_s (zone 3)

- (18) $[[\text{Matti-}a_2 \quad \text{häve-ttä-}ä_1]_4 \quad \text{lähte-}ä_5]_6$
 Matti-PART be.ashamed-CAUS-3SG.PRES leave-INF1
 ‘[[Matti₂ [feels ashamed]₁]₄ to leave₅]₆.’



T-tier: *Hunch*: $P_s(\text{zone 2-1}) < P_s(\text{zone 3})$

3.2 The semantics of the matrix verb

As shown in the preceding section the temporal structure of the causative emotion verb + infinitive 1 -construction can be determined by the aspect of the infinitive 1 complement. In this section I will demonstrate that the temporal structure of the construction can also be determined by the semantics of the matrix verb. The second question to be answered is: Why does the clause *Mattia janottaa kävellä kotiin* ‘It makes Matti thirsty to walk home’, not sound natural in Finnish? What rule of grammar does it violate? We are aware of the fact that walking and other forms of physical exercise may cause thirst. Thus the clause *Mattia janotti pitkä kävelymatka*, ‘The long walk made Matti thirsty’, is semantically correct (20):

- (19) **Matti-a jano-tta-a kävel-lä koti-in.*
 Matti-PART be.thirsty-CAUS-3SG.PRES walk-INF1 home.1SG-ILLAT
 ‘It makes Matti thirsty to walk home.’

- (20) *Matti-a jano-tt-i pitkä kävelymatka.*
 Matti-PART be.thirsty-CAUS-3SG.PAST long.NOM walk.NOM
 ‘The long walk made Matti thirsty.’

As can be seen in (19) and (20) the question about the clause anomaly in (19) does not concern the incompatibility between the meanings of the words, but rather the fact that the construction in question cannot be connected by the matrix verb *janottaa* (‘be thirsty’) and the infinitive 1 verb *kävellä* (‘walk’). A physical situation can cause another physical situation only if it precedes it. This means that the situation expressed by the infinitive 1 verb must precede the situation expressed by the matrix verb in (19). As already shown, this kind of temporal structure, i.e. *Launching* (16: **Mattia hävettää nyt kävellä kotiin eilen*), is not possible.

Thus, one reason for this kind of clause anomaly is the syntactic restriction of the non-finite verb in the subordinated clause.

Another reason for this kind of clause anomaly is the fact that the temporal structure *Hunch* is not possible, either (see 22).

- (21) *Matti-a heiko-tta-a nous-ta.*
 Matti-PART be.weak-CAUS-3SG.PRES get up-INF1
 ‘Matti feels weak to get up.’

- (22) **Matti-a yski-ttä-ä nous-ta.*
 Matti-PART cough-CAUS-3SG.PRES get up-INF1
 ‘Matti feels like coughing to get up.’

For example the clause *Mattia heikottaa nousta ylös* (‘Matti feels weak to get up’) probably has the reading that the state of weakness precedes the concrete rising. Thus, the coming physical situation, expressed by the infinitive 1 complement, cannot be interpreted as the cause for the state of emotion. It is only the **thought** of the upcoming physical situation that causes the state of emotion, i.e. it is the thought of the coming ‘getting up’ that causes the state of weakness. Because the state of weakness is caused only by the **thought** of the upcoming situation, the verb *heikottaa* (‘feel weak’) cannot be interpreted as purely physical. It must be interpreted as both physical and mental concurrently, or as psychophysical. The *Hunch* or such a temporal structure, where the situation expressed by the matrix verb precedes the situation expressed by the infinitive verb, requires that the causative emotion verb can be interpreted as mental.

If, on the other hand, the causative emotion verb expresses a purely physical state of emotion, as in the clause (22): *Mattia yskittää nousta ylös* (‘Matti feels like coughing to get up’), the clause is anomalous. This follows from the fact that a physical situation can cause another physical situation only if it precedes it. Thus, the causative emotion verb + infinitive 1 -construction is semantically acceptable only in connection with mental or psychophysical, but not with purely physical causative emotion verbs. I formally describe the principles for a well-formed causative emotion verb + infinitive 1 -construction using the following rule:

Rule 2: The well-formed construction -rule:

If conditions (c) and (d) hold, then the causative emotion verb + infinitive 1 -construction is well-formed:

- (c) T-structure of the construction is: *Entrainment*:

P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)
or

Hunch: P_s (zone 2-1) < P_s (zone 3)

(d) S-field (zone 2-1) is psychophysical or mental

(c) and (d) → *well-formed construction*

By connecting the *temporal structure* -rule and the *well-formed construction* -rule I formally describe the principles for the factors that determine the temporal structure of a well-formed construction as follows:

Rule 3: The temporal structure of a well-formed construction -rule

The temporal structure of a well-formed causative emotion verb + infinitive 1 -construction is determined by the properties of both (zone 3) and (zones 2 and 1):

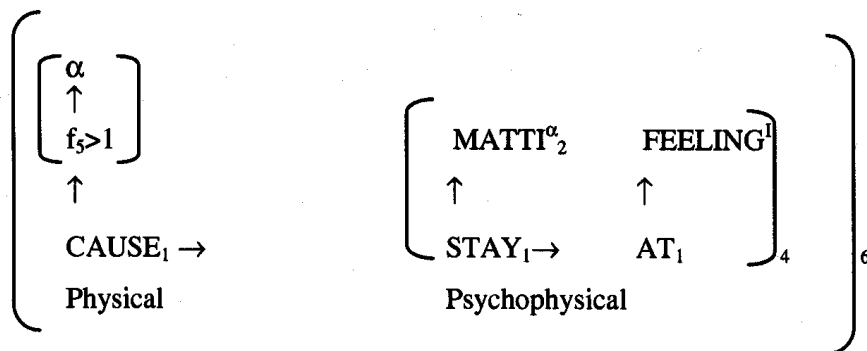
If conditions (a) and (d) hold, then the *Entrainment* is well-formed:

(a) T-tier (zone 3) is R

(d) S-field (zone 2-1) is psychophysical or mental

(a) and (d) → *Entrainment*: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)

(23) [[*Matti-a*₂ *heiko-tta-a*₁]₄ *kävel-lä*₅]₆
Matti-PART be.weak-CAUS-3SG.PRES walk-INF1
'[[*Matti*₂ [feels weak]₁]₄ to walk₅]₆.'



T-tier (zone 3) is R

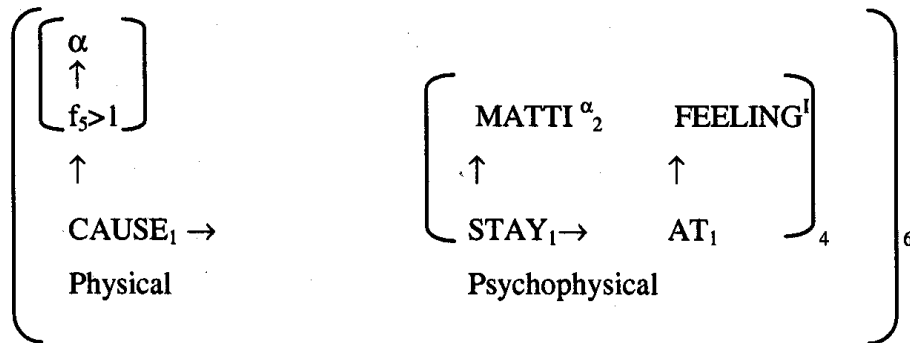
S-field (zone 2-1) is psychophysical

→ *Entrainment*: P_s (zone 2-1) = P_s (zone 3) and P_f (zone 2-1) = P_f (zone 3)

If conditions (b) and (d) hold, then the *Hunch* is well-formed:

- (b) T-tier (zone 3) is P
 (d) S-field (zone 2-1) is psychophysical or mental
 (b) and (d) → *Hunch*: P_s (zone 2-1) < P_s (zone 3)

- (24) [[*Matti-a*₂ *heiko-tta-a*₁]₄ *nous-ta*₅]₆
 Matti-PART be.weak-CAUS-3SG.PRES get up-INF1
 ‘[[*Matti*₂ [*feels weak*]₁]₄ to get up₅]₆.’



- T-tier (zone 3) is P
 S-field (zone 2-1) is psychophysical
 → *Hunch*: P_s (zone 2-1) < P_s (zone 3)

The answer to the question why clauses like *Mattia janottaa kävellä kotiin* (‘It makes Matti thirsty to walk home’) do not sound natural in Finnish, is that neither *Launching* nor *Hunch* are possible temporal structures in this kind of clauses. This is a consequence of both semantic and syntactic restrictions of the construction. One restriction concerns the semantics of the matrix verb (i.e. causative emotion verb). Because a physical situation can cause another physical situation only if it precedes it, the only possible temporal structure is *Launching*, i.e. the situation expressed by the infinitive 1 must precede the situation expressed by the matrix verb. Irrespective of the semantics of the matrix verb, this kind of temporal structure, i.e. *Launching*, is syntactically not possible in the causative emotion verb + infinitive 1 -construction, because the non-finite verb in the clause complement cannot occur in different tenses. Thus, another restriction is syntactical. The *Hunch*, which means that the caused situation precedes the causing, requires that the causative emotion verb can be interpreted as mental. Thus, the *Hunch* is not a possible temporal structure, either, in the clause above because of the semantics of the causative emotion verb.

4. Conclusions

Potential temporal structures in the causative emotion verb + infinitive 1 - construction are *Entrainment*: P_s (zone 2-1) = P_s (zone 3) and *Hunch*: P_s (zone 2-1) < P_s (zone 3). According to the *temporal structure -rule (Rule 1)*, the temporal structure is determined by the aspect of the infinitive verb. If the T-tier of the infinitive verb is a region of time (R) (*Mattia heikottaa kävellä* ‘Matti feels weak to walk’), then the temporal structure of the clause is *Entrainment*. If, on the other hand, the T-tier of the infinitive verb is a point of time (P) (*Mattia heikottaa nousta* ‘Matti feels weak to get up’), then the temporal structure is *Hunch*. Thus, in the *temporal structure -rule* it is presupposed that the semantic field of the matrix verb is mental (e.g. *hävettää* ‘feel ashamed’) or psychophysical (e.g. *heikottaa*, ‘feel weak’).

The *well-formed construction -rule (Rule 2)* shows that clauses like **Mattia janottaa kävellä kotiin* ‘It makes Matti thirsty to walk home’ and **Mattia yskittää nousta ylös* ‘Matti feels like coughing to get up’ are not acceptable, because the semantic field of the matrix verb in both sentences is physical. This semantic field of the matrix verb requires that the temporal structure of the clause is *Launching*, which is not possible in this construction (see *rule 1*). Thus, the two sentences above break the well-formed construction -rule (see *rule 2*). Finally, the temporal structure of a *well-formed* causative emotion verb + infinitive 1 -construction is determined by the properties of both the infinitive 1 verb and the matrix verb (see *rule 3*).

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Contact information:

Michaela Pörn
 Åbo Akademi University
 Faculty of Education
 P.O. Box 311
 FI-65101 VAASA
 FINLAND
 e-mail: michaela(dot)poern(at)abo(dot)fi