Dimensions and Force Dynamics in Perception and Grammar: A Grammaticalization Perspective*

Seongha Rhee (Hankuk University of Foreign Studies)

Seongha Rhee. 2012. Dimensions and Force Dynamics in Perception and Grammar: A Grammaticalization Perspective. *Studies in Modern Grammar* 70, 181-206. The concept of causality is among the primary human conceptualizations and thus carries special significance in its linguistic representation. This is well illustrated by numerous cognitive explorations with respect to 'force dynamics'. Since the human construal of caused events in real-world situations involves diversified classification of the causal force, the causal force takes on equally diverse linguistic representations. In Korean such dimensionality of causality is perceptually attributable to, and analytically retrievable from, the semantics of the source lexemes of the complex postpositions and connectives, where the so-called defective nouns participate as a nominal component of the formal constructs. The typology of causality along the physical dimension bears significance in that the members of each subcategory exhibit different behavior in terms of their syntagmatic cooccurrence, as a result of differing semantic constraints. This paper shows that there is a systematic correlation between the semantics of the source nominals and that of the grammaticalized forms; that the dimensional differences can account for the interchangeability and incompatibility among complex postpositions and connectives; and that the grammaticalization process often involves subjectification of the language user, whereby only a particular aspect of an event is selected for emphasis.

[Key words: grammaticalization, dimension, force dynamics, perception]

---

1. Introduction

The concept of causality is among the primary human conceptualiza-tions, and psychological research shows that causal beliefs and reasoning are deeply embedded in many parts of our cognition (Sloman 2005, as cited in Danks 2009: 326). Danks (2009) says that causal perception consists of the relatively automatic, relatively irresistible perception. Due to the ubiquity of causal perception, it carries special significance in its linguistic representation as well. This is well illustrated by numerous cognitive explorations advanced by Talmy (1988, 1995) and Sweetser (1990) with respect to 'force dynamics' and by Bybee (1985) with respect to relevance in the ordering patterns of verbal morphology of causatives.

Since the human construal of caused events in real-world situations involves diversified classification of causal forces, it is not surprising that the causal force takes on equally diverse linguistic representations. The "encounter" of causal forces by the experiencer may be encoded by diverse prepositions in English, as illustrated in (1):

(1) a. Causal force as an encountered entity:
  *I was surprised **at** the news.*
 b. Causal force as a capable agent:
  *I was dumfounded **by** the truth.*
 c. Causal force as a space or a container:
  *The house was destroyed **in** a tornado.*

Korean is an interesting language where such dimensionality of causality is perceptually attributable to, and analytically retrievable from, the semantics of the source lexemes of the complex connectives (CCs) and complex postpositions (CPs) of causality, where the so-called defec-tive nouns (DNs) participate as a nominal component of the formal construct.

There has been continued interest in the studies of defective nouns

(Ahn 2001, Rhee 2011 for an overview), mostly with respect to their morphosyntactic and categorial characteristics. However, the causality markers in the form of CCs and CPs have received scanty attention from the grammaticalization perspective (cf. Ahn 1997, Chae 2003, and Lee 2007 are major exceptions). Furthermore, it has not been noted yet that the defective nouns in these causal connectives and postpositions have the dimensionality variable as part of their inherent semantics, and that this intricate dimensionality determines the complex behavior of the CCs and CPs.

The research objectives are twofold: to illustrate how CCs and CPs of causality can be classified according to the dimensional parameter and to analyze how dimensional differences are reflected in conceptualizing events and in linguistic representation of causality. This paper is organized in the following way: Section 2 addresses adnominalizers and formal constructs of CCs and CPs as preliminaries; Section 3 explains dimensional categorization, target forms and the lexical meanings of the forms involved; Section 4 illustrates the grammaticalization processes of CCs and CPs by dimension; Section 5 discusses such theoretical issues as conceptualization of causal forces by dimension, layering of grammatical forms, persistence and specialization, and subjectification; and Section 6 concludes the paper.

2. Preliminaries

This section presents two concepts the understanding of which is necessary for discussion of the issues addressed in this research, i.e. the adnominalizers and the formal constructs of CCs and CPs.

2.1. Adnominalizers

In Korean a modifier precedes the modified nominal, an attribute of

a verb-final language. A pre-nominal modifier requires an adnominalizer. There is a quadripartite classification of adnominalizers depending on the time of the predicate in relation to the reference time: anterior, retrospective, simultaneous, and prospective.[1]

(2) a. *-n.*   Anterior adnominalizer (Ant.Adn)
      o-n salam   'a person who came'
  b. *-ten.* Retrospective adnominalizer (Retro.Adn)
      o-ten salam 'a person who used to come'
  c. *-nun.* Simultaneous adnominalizer (Simul.Adn)
      o-nun salam   'a person who is coming'
  d. *-l.*   Prospective adnominalizer (Pros.Adn)
      o-l salam   'a person who will come'

As is shown in (2), adnominalizers are differentiated by the relative time, i.e. before, concurrent, after, or habitual (or ongoing at the moment of recollection). The fact that adnominalizers are invariably associated with the temporal notion is responsible for the fact that they are commonly misunderstood as tense markers, which, in contrast, are based on the temporal location relative to the speech time.[2]

2.2. Formal Constructs of CCs and CPs

The typical formal constructs of causality-marking CCs and CPs are as shown in (3) and (4).[3]

---

[1] The retrospective adnominalizer *-ten* and simultaneous adnominalizer *-nun* may be historically bimorphemic: the former a combined form of the retrospective *-te-* and the anterior *-n*, and the latter of the current relevance *-nu-* (historically *-nA-*) and the anterior *-n*. However, the granularity of the analysis of the adnominalizers has no bearing on the current discussion.

[2] The conceptual and functional affinity between tenses and the temporal marking in adnominalizers may quality the latter as members of the 'secondary tenses' (Diewald 2011) or 'relative tenses' (Hengeveld 2011), or 'relational tense' (Hopper & Traugott 2003: 152), even though the latter is largely restricted to state-of-affairs designations.

(3) Genitive Construction (CP)

    a. X-(uy)   **DN-ey**

       X-(Gen)   DN-at

       'because of X' (= 'at the DN of $X_{[Nominal]}$')

    b. kyothong sako   **thas-ey**[4)]

       traffic   accident   blame-at

       'because of a traffic accident'

       (< Lit. 'at the cause of a traffic accident')

(4) Adnominalizer Construction (CC)

    a. X-n/ten/nun/l   **DN-ey**

       X-Adn   DN-at

       'because of X' (= 'at the DN of $X_{[Verbal]}$')

    b. kyothong sako-ka   na-**n**   **thas-ey**

       traffic   accident-Nom occur-Ant.Adn   blame-at

       'because of a traffic accident' (< Lit. 'at the blame of a traffic accident having occurred')

As is shown in the above, the connective pattern illustrated in (4) takes the verbal predicate and turns it into a peripheral element headed by a postposition -*ey*, signifying a cause for the event or state denoted by the main clause. The postposition, roughly equivalent to English 'at', significantly contributes to the meaning creation of causality, as exemplified in (1a) above.[5)] Just as the predicates, such as 'marvel', 'wonder', 'be

---

[3] For glosses in the data, the following abbreviations are used: Acc: accusative; Adn: adnominal; Ant: anterior; Benef: benefactive; Caus: causative; Comp: complementizer; Cond: conditional; Conn: connective; Cop: copula; Dec: declarative; Determ: determinative; Dir: directional; DN: defective noun; End: sentential ending; Fut: future; Gen: genitive; Hon: honorific; Hort: hortative; Imp: imperative; Inten: intentional; Neg: negative; NF: non-finite; Nom: nominative; Nomz: nominalizer; Perf: perfective; Pol: polite; Pres: present; Proh: prohibitive; Pros: prospective; Pst: past; Q: interrogative; Retros: retrospective; Simul: simultaneous; Top: topic; and Tri: trial.

[4] The naturalness of the phrases with or without the genitive marker -*ey* largely depends on the lexical idiosyncrasy and the genre of the text the expression occurs in.

[5] Hoffmann (2005) extensively studied the grammaticalization processes of

amazed', 'be astonished', 'be surprised', etc., contribute to the interpreta-tion of 'causality', so do the nominals in Korean, such as *thas* 'blame' in (3) and (4). In this context, it is noteworthy that causality marking by means other than these CCs and CPs may not necessarily involve the locative postposition *-ey* but the instrumental postposition *-lo,* as il-lustrated by *iyu-lo* 'reason-Inst', *wenin-ulo* 'cause-Inst', *kkatalk-ulo* 'cause/ reason-Inst' and *thas-ulo* 'blame-Inst'.

As is shown in the formal construct, the nominals typically recruited are DNs or defective nouns; defective in the sense that they have limitations in standing alone.[6] As is the case with many paradigms, however, this property is by means peculiar to DNs (cf. 'categoriality' Hopper & Thompson 1985: 151; Hopper 1991; see also 'emergent grammar' Hopper 1987). Thus, the membership of many forms in the DN paradigm is largely variant depending on the researcher's subjective judgment on defectiveness of the 'nouniness', or nominal characteristics. For instance, Huh (1995) lists as many as 99 DNs, whereas Ko (1989[1970]), Lee (1988), Ahn (2001) and others list around 50 DNs. Like-wise, in the case of CCs and CPs, certain forms still preserve the autonomous characteristics of regular nouns, whereas some are considerably devoid of them (see 3.2 for further discussion).

3. Dimensional Categorization and Target Forms

3.1. Dimensional Typology

The notion of 'dimension' is fundamentally of physics or mathematics

---

English complex prepositions whose formal construct is [Prep + Noun + Prep] as in *in terms of, in front of, on behalf of, in connection with, in view of, by virtue of,* etc.

[6] For this defective nature of the nominals in this category, they tend to function as nominalizers which are often stripped off of their lexical meanings. For the discussion of these DNs nominalizing function, see Rhee (2011).

relating to the properties of an entity or of a space. Even though there are different ways of defining a particular dimension, the notion itself is hard-wired in human physiology and is embodiment of physical reality since humans occupy both the spatial and temporal dimensions or in the 4-dimensional "spacetime" (i.e. a Minkowski space, or Minkowski spacetime), a concept that designates the unified whole of space and time (Minkowski 1908/9).

From the perspective of Euclidean mathematics, the dimension of Euclidean n-space E^n is n. Ignoring the theoretical complexities, the dimensions that humans can conceptualize based on their experience are from Dimension 0 to Dimension 4, which can be diagrammatically presented as in (5).

(5) Dimensional typology (based on Euclidean n-space concept)

Dimension	Geometric Shape	Linguistic Exemplar (DN)	Literal Meaning	Diagram
Dimension 0 (E^0)	point	cham cek kim tey sesul ttaynmun kkatalk thas	'point in space/time' 'point in time' 'opportunity' 'place' 'blade' 'reason/cause' 'reason/cause' 'blame, fault'	●
Dimension 1 (E^1)	line	kil kyel cha	'way' 'grain (of wood)' 'sequence'	▬
Dimension 2 (E^2)	plane	matang the	'field, ground' 'ground'	▭
Dimension 3 (E^3)	space	thong palam	'barrel, cylinder' 'wind'	(cylinder)
Dimension 4 (E^4)	tesseract	tungssal wacwung soyongtoli	'turmoil' 'whirlpool' 'whirlpool'	(tesseract)

As is shown in the listing of the DN exemplars in (5), the largest number of DNs is found at Dimension 0, which suggests that humans predominantly conceptualize a causal force as a point (i.e. an entity as a whole, rather than one with a visible internal structure). It is important to note that a causer in the real world may always be in Dimension 4

since they should occupy spatial and temporal dimensions and thus that the dimensional designations are simply a matter of human concep-tualization rather than of the strictly physical reality.

3.2. Target Forms

As was indicated in 2.2, the 'defectiveness' of DNs is subject to subjective judgment and thus is variable. For instance, the lexical origins of E^0 nouns *cham* 'point', *kim* 'opportunity' and *sesul* 'blade' are opaque and their primary function is largely restricted to nominalizing; the lexical nature of *tey* 'place', *ttaymwun* 'cause/reason', and *kkatalk* 'cause/reason' seem to be more easily perceivable; whereas *thas* 'blame' may be less defective than others. Similarly, E^1 nominal *kil* 'way' and E^2 nominals *matang* 'yard, ground' and *the* 'ground, lot', and E^3 nominal *thong* 'barrel' seem to be far less defective since they may function as fully lexical nouns in certain contexts. It is noteworthy, however, that the semantics of these nominals in CCs and CPs is so much removed from their original meanings that even when a lexeme appears to be fully lexical retaining all categorial properties of a noun, its meanings may be best understood as constituting an instantiation of polysemy. Given the variability of membership of DNs in general, therefore, an inventory of DNs that participate in the formation of CCs and CPs is by no means fixed. However, granting that the membership is variable, the CCs and CPs formed with Dimension 0 DNs and their literal meanings are as listed in (6):

(6) Dimension 0 (E^0: 'Point') DNs   (X: verbal; Y: nominal)
    a. X-Adn *cham-ey*   'at the point of X'
    b. X-Adn *kim-ey*   'at the opportunity of X'
    c. X-Adn *tey-ey*   'at the place of X'
    d. X-Adn *sesul-ey*   'at the blade of X'
       Y(-uy)-*sesul-ey*   'at the blade of Y'

    e. X-Adn *ttaymwun-ey*   'at the cause/reason of X'
       Y-*ttaymwun-ey*   'at the cause/reason of Y'
    f. X-Adn *kkatalk-ey*   'at the reason/cause of X'
       Y-*kkatalk-ey*   'at the reason/cause of Y'
    g. X-Adn *thas-ey*   'at the blame of X'
       Y-*thas-ey*   'at the blame of Y'

As shown in the list, some forms such as *cham* 'point in time', *kim* 'opportunity', and *tey* 'place' in (6a-6c) render themselves only to the adnominal constructions, thus, CCs only, whereas the other DNs constituting the forms in (6d-6g) form both CCs and CPs. The members of the latter group, in turn, is not constructionally equivalent in that *sesul* 'blade' allows for the genitive *-uy* while the others do not.

The CCs formed with Dimension 1 DNs and their literal meanings are as listed in (7):

(7) Dimension 1 (E^1: 'Line') (X: verbal)
    a. X-Adn *kil-ey*   'at/on the way of X'
    b. X-Adn *cha-ey*   'at/on the sequence of X'
    c. X-Adn *kyel-ey*   'at/on the grain of X'

The DNs *kil* 'way' and *cha* 'sequence' denote a line. *Cha* is a Sino-Korean word with various sequence-related meanings such as 'order, next in line, place, procession, number of times, etc.' These Dimension 1 nominals form CCs only.

The CCs formed with Dimension 2 DNs and their literal meanings are as listed in (8):

(8) Dimension 2 (E^2: 'Plane') (X: verbal)
    a. X-Adn *matang-ey*   'on/in the field/ground of X'
    b. X-Adn *the-ey*   'on/in the ground of X'

The Dimension 2 nominals denote a plane. The two nominals in this category, i.e. *matang* 'field, ground, yard' and *the* 'lot, ground', form CCs

only. Incidentally, since 'a ground' or 'a lot (of a building site)' can be metaphorically used to refer to a foundation, it lent itself to the grammaticalization of many grammatical forms (Rhee 2008b).

The CCs and CPs formed with Dimension 3 DNs and their literal meanings are as listed in (9):

(9) Dimension 3 (E^3: 'Space') (X: verbal; Y: nominal)
    a. X-Adn *thong-ey*   'in/within the barrel/cylinder of X'
      Y-*thong-ey*   'in/within the barrel/cylinder of Y'
    b. X-Adn *palam-ey*   'in/within the wind of X'
      Y-*palam-ey*   'in/within the wind of Y'

The Dimension 3 nominals denote a space. The two nominals in this category, i.e. *thong* 'barrel' and *palam* 'wind', make reference to the causal force as something that can enclose an affected entity either as an enclosed space (a barrel) or as an extensive area without a clear boundary (a wind). These nominals participate in the development of CCs and CPs, but that of CPs is marginal in the sense that they occur at a very low frequency. Furthermore, in the case of *palam* 'wind', the CP use is largely restricted to when the nominal Y is a demonstrative, e.g. *i* 'this' and *ku* 'that'.

Finally, the CC and CP formed with Dimension 4 DN is as shown in (10):

(10) Dimension 4 (E^4: 'Tesseract') (X: verbal; Y: nominal)
    X-Adn *tungssal-ey* 'in/within the turmoil of X'
    Y-*(uy) tungssal-ey* 'in/within the turmoil of Y'

The DN in Dimension 4 that participates in the formation of a CC and CP denoting causality is *tungssal* 'turmoil' only. Other DNs in the E^4 dimension, i.e. *wacwung* and *soyongtoli*, see (5) above), do not seem to carry causality meaning sufficient to qualify them as causality CCs or CPs. In terms of membership, there is room to categorize the previously

discussed *palam* 'wind' as belonging to Dimension 4 by virtue of the fact that a wind typically is more than something that envelopes an entity within its scope of effect, i.e. there is continuous force being imposed on an entity placed within the scope of wind. However, the nature of force of a wind and a turmoil is qualitatively different in terms of the level of its dynamism involved. This again suggests that the categorization is by no means unique or exclusive because human conceptualization on which it is based is itself variable.

3.3. Data: Lexical Meanings

As was indicated in 2.2, DNs have variable degrees of 'nouniness'. Despite their variable degrees of defectiveness they do carry lexical meanings. The semantics of DNs in the CCs and CPs are in fact lexical in nature in that they function as a nominalizer for causality. The following illustration is restricted to the lexical uses of some of the DNs in other than CCs and CPs.

(11) a. E^0 *cham* 'point in time'
     cikum   ka-lye-ten   <u>cham</u>-i-ya
     now   go-Inten-Retro.Adn   point-be-End
     'I was about to leave now.'
     << (Lit.) '(I) was (at) the point of intending to go now.'

  b. E^1 *kil* 'way'
     thoykunha-nun   <u>kil</u>-i-ya
     return.from.work-Simul.Adn   way-be-End
     'I'm on the way home from work.'
     << (Lit.) '(I) am (on) the way of returning from work.'

  c. E^2 *the* 'ground, land, foundation, lot'
     nelp-un   <u>the</u>-ey   khun   cip-ul   ci-ess-ta.
     large-Ant.Adn   ground-at   big   house-Acc   build-Pst-Dec
     '(I) built a big house on a large land.'

d. E^3 *palam* 'wind'

   palam-i   sey-ta
   wind-Nom   be.strong-Dec
   'It's windy (today).'
   << (Lit.) 'The wind is strong.'

e. E^4 *tungssal* 'turmoil'

   ai-tul   **tungssal**-ey swi-l   thum-i   eps-ta
   child-Pl turmoil-at   take.rest-Pros.Adn leisure.time-Nom not.exist-Dec
   'I don't have time to take a rest because of children.'
   << (Lit.) 'At the turmoil of the children...'

4. Grammaticalization of CCs and CPs

The CCs and CPs are grammaticalized constructions of DNs. The formal makeup of these constructions has been exemplified in 3.2. In this section, the data of some of the CC and CP examples are presented along with their semantic change concomitant with their grammaticalization processes.

4.1. Dimension 0 DNs

Some of the CCs and CPs involving E^0 DNs are as exemplified in (12).

(12) *cham, sesul, thas* (E^0 DNs)
   a. *-n cham-ey* [at the point of] (CC)
      paykophu-[n   cham-ey]   cal   mek-ess-ta
      be.hungry-[Ant.Adn   point-at]   well   eat-Pst-Dec
      'I enjoyed the meal because/while I was hungry.'

   b. *-nun sesul-ey* [at the blade of] (CC)
      ku   kohamchi-[nun   sesul-ey]   hon-i   naka-ss-ta
      the yell-   [Simul.Adn   blade-at]   spirit-Nom   go.out-Pst-Dec
      'I was at a loss because he yelled (at me).'

   c. *-thas-ey* [at the blame of] (CP)
      nalssi   [thas-ey]   cangsa-ka   an   toy-n-ta
      weather [blame-at]   business-Nom   Neg become-Pres-Dec
      'The business is slow because of the weather.'

As exemplified in (12), *cham* 'point in time' in the CC offers a dual interpretation, i.e. causal and temporal; *sesul* 'blade' in the CC suggests a metonymic-metaphorical interpretation, i.e. [blade > weapon > threat > intimidation]; and *thas* 'blame' in the CP is closest to its lexical meaning.

The overall semantic change of the CCs and CPs can be diagrammatically characterized as in (13):[7]

(13) Dimension 0 nominals

a.	*cham:*	at the point of X	>>	because of X
b.	*kim:*	at the opportunity of X	>>	because of X
c.	*tey:*	at the place of X	>>	because of X
d.	*sesul:*	at the blade of X	>>	because of X
e.	*ttaymwun:*	at the reason of X	>>	because of X
f.	*kkatalk:*	at the reason of X	>>	because of X
g.	*thas:*	at the blame of X	>>	because of X

The CCs and CPs with Dimension 0 nominals tend to signify direct, yet often incidental, dynamic contacts between the causal force and its recipient. From a formal perspective, in grammaticalization of connectives, the internal genitive marker (*-uy*) nearly never occurs, resulting in juxtaposition of two nominals (thus, resembling compounding). This indicates the close conceptual relationship between the two nominals (e.g. uninterrupted one-on-one contact).

The semantics of the original constructions, especially those involving spatial DNs, egs. ((13a)-(13d)), merely conveys: "Someone did A at the point of B," expressing the person's non-inessive location. This incidental location is construed later as the causal condition. This is an instance of 'subjectification' (Traugott 1982, Traugott & Dasher 2002, see 5.4 below)

---

[7] The DN *tey* 'place' here, which cooccurs with the locative *-ey*, tends to refer to a space as a bounded entity (Dimension 0) with which the trajector comes into contact, rather than as a spatial extension (Dimension 2) within which the trajector is situated. In the latter case, the locative *-eyse* is chosen over *-ey*.

in that mere coexistence of the trajector and the landmark is subjectively interpreted as the former being causally affected by the latter. This subjective inference is widely variable and the sentences are interpretable either with or without causal meaning.

4.2. Dimension 1 DNs

The E^1 DNs form CCs only, as indicated earlier, and their uses are illustrated in (14).

(14) *kil, kyel* (E^1 DNs)
    a. *-nun kil-ey* [at the way of] (CC)
        ton   ssu- [nun   kil-ey]   ta   ss-epeli-ca
        money spend-[Simul.Adn   way-at]   all   spend-Perf-Hort
        'Let's spend all the money since (= now that) we are spending it.'
    b. *-n kyel-ey* [at the grain of] (CC)
        cengsin-i   honmiha- [n kyel-ey]   telkheng
        mind-Nom   be.stupefied-[Ant.Adn grain-at] suddenly
          yaksok-ul   ha-ypeli-ess-ta
          promise-Acc do-Perf-Pst-Dec
        '(I) promised against my will because I was stupefied.'

The use of DN *kil* 'way' for CC formation seems straightforwardly motivated by the lexical meaning in that humans typically conceptualize the cause and effect in terms of a linear development along a time-line, as is well exemplified by the expression 'the causal chain'. The DN *kyel* 'grain of wood; wave of water' seems to be less frequently used, but the conceptualization of 'grain' and 'wave' as having the nature of linearity seems to motivate its use in CC in a similar way.

The overall semantic change of the CCs can be diagrammatically characterized as in (15):

(15) Dimension 1
    a. *kil:*   on the way of X   >>   because of X

   b. *cha:*   on the sequence of X   >> because of X
   c. *kyel:*   on the grain of X   >> because of X

The connectives and postpositions with Dimension 1 nominals signify linear, often temporal, connection of the causation event. The semantics of the original constructions merely conveys: "Someone did A on the way of/to B," expressing the person's location. This location is interpreted with respect to the next event in the causal relation. This is again an instance of subjectification based on the dynamic interpretation of two events on a temporal sequence into a causal chain.

The causality reading is a little more readily available (albeit depending on the contexts) than Dimension 0 cases, but incidentality and contingency readings are also often available.

4.3. Dimension 2 DNs

The E^2 DNs also form CCs only, and their uses are illustrated in (16).

(16) *matang, the* (E^2 DNs)
    a. *-nun matang-ey* [in the field of]
      ta-tul   ton   pe-   [nun   matang-ey]
      all-Pl   money earn-[Simul.Adn field-at]
        na-to   ton   com   pel-epo-ca
        I-too   money a.little earn-Tri-Hort
      'Since everyone is making money, let me make some money, too.'
    b. *-ten the-ey* [on the ground of]
      pay-ka   kophu- [ten   the-ey]
      stomach-Nom be.hungry-[Retros.Adn ground-at]
        acwu cal   mek-ess-ta
        very   well   eat-Pst-Dec
      '(I) ate very well because I had been hungry.'

The overall semantic change of the CCs can be diagrammatically characterized as in (17):

(17) Dimension 2

    a. *matang*: in the field of X   >> because of X

    b. *the*:   in the ground of X >> because of X

The CCs and CPs with Dimension 2 nominals largely signify causal forces operating as the background or basis. In general, the semantics of the original constructions merely says "Someone did A while he/she was on the ground of B," expressing the ground the person stands on. This location is conceptualized as the enabling condition (i.e. causal event) of the subject's action. This is again an instance of subjectification, as were the cases with the previously discussed E^0 and E^1 DNs. The causality reading with the CCs involving E^2 DNs is more readily available than those involving E^0 and E^1 DNs.

4.4. Dimension 3 DNs

The E^3 DNs form CCs and CPs, and their uses are illustrated in (18).

(18) *thong, palam* (E^3 DNs)

    a. *-nun thong-ey* [in the barrel of]

      nemwu   saceng-ul ha-[nun   thong-ey]

      very   plea-Acc do-[Simul.Adn   barrel-at]

        an   to-wacu-lswukaeps-ess-ta

        Neg   help-Benef-cannot-Pst-Dec

      'Since (he) pleaded so much I could not but help him.'

    b. *-nun palam-ey* [in the wind of]

      pi-ka   o-   [nun   palam-ey]   kyeyhoyk-i

      rain-Nom come- [Simul.Adn wind-at]   plan-Nom

        ta mangkaci-ess-ta

        all   get.spoiled-Pst-Dec

      'Since it rained, all our plans fell through.'

The overall semantic change of the CCs and CPs involving E^3 DNs can be diagrammatically characterized as in (19):

(19) Dimension 3
    a. *thong:* within the barrel of X >>   because of X
    b. *palam:* within the wind of X >>   because of X

The CCs and CPs with Dimension 3 nominals tend to signify more overpowering causal force, i.e., the recipient is subject to multi-dimensional causal force as if it is located 'within' a gust of wind or a cylindrical container. The semantics of the original constructions conveys: "Someone did A while inside the barrel/wind of B," where an event is conceptualized as a container in which the person's autonomy/ freedom is greatly restricted by the physical boundary (cf. 'container metaphor' or 'ontological metaphor' whereby a causal situation is represented as a container: Lakoff & Johnson 1980). For this reason, the constructions involving E^3 DNs are so strongly associated with the causality marking that the causality reading is primary in them.

4.5. Dimension 4 DN

The E^4 DN forms a CC and a CP, and their uses are illustrated in (20).

(20) *tungssal* (E^4 DN)
    a. *-nun tungssal-ey* [inside the turmoil of]
        ay-tul-i   ttetu-   [nun   tungssal-ey]
        child-Pl-Nom   make.noise-   [Simul.Adn   turmoil-at]
          kongpwu-lul   ha-lswukaeps-ta
          study-Acc   do-can-Dec
        '(I) cannot study since children are making noise too much.'

    b. *-tungssal-ey* [inside the turmoil of]
        sinwui-(uy)   [tungssal-ey]   sa-nun   ke-y
        sister-in-law-(Gen)   [turmoil-at]   live-Simul.Adn thing-Nom
          himtul-ta
          be.difficult-Dec
        '(Her) life is difficult because of (her) sister-in-law.'

The examples in (20) invoke the image of a trajector ("(I)" or "(she)")

being placed within a turmoil of unbearable noises by the children or within an incessant complaint and acts of malice by her sister-in-law.

The overall semantic change of the CC and CP involving the E^4 DN can be diagrammatically characterized as in (21):

(21) Dimension 4
    tungssal: within the turmoil of X   >> because of X

The CC and CP with the Dimension 4 nominal signify more dynamic, compelling, consistent and unavoidable causal force imposed on the recipient of the action or the experiencer of the event. Therefore, the causality meaning in the constructions involving the E^4 DN is fully conventionalized and cannot be flouted.

In terms of perception, the fourth dimension ('tesseract', 'tetracube', 'hypercube') is not very prominent and is often perceived and re-presented reductively as the third dimension. Consequently, the nominals in Dimensions 3 and 4 tend to be interchangeable, but with some minor differences in semantic nuance and at the expense of naturalness in some cases. The degree of causality also decreases as a consequence.

5. Discussion

In this section we discuss some of the theoretical issues related to the dimension and causality in the grammaticalization processes of CCs and CPs. A special attention is paid to the dimensional differences of causality perception, layering, persistence and subjectification.

5.1. Conceptualization of Causal Forces by Dimension

The conceptualization of causality according to dimensions can be diagrammatically presented as in (22).

(22) Causality Dimensions

| Dimension 0 | Dimension 1 | Dimension 2 | Dimension 3 | Dimension 4 |
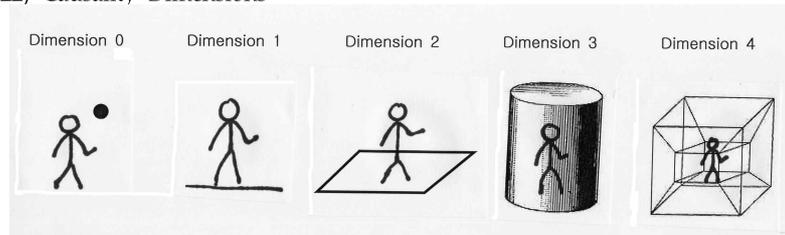
As shown in the diagram, the perceived causality originates from being in coexistence (E^0), on a line (E^1), on a plane (E^2), in an enclosed space (E^3), and in a turbulence (E^4). Some of the typical verbal or nominal forms that occur with CCs and CPs in contemporary data from the KAIST KORTERM corpus are as shown in (23):

(23) Typical Causers by Dimension
    a. Dimension 0:
        (i) blurting out a threatening word
        (ii) looking with glaring eyes
        (iii) thumping on the table...

    b. Dimension 1:
        (i) spending money
        (ii) working serialized tasks
        (iii) sightseeing various places...

    c. Dimension 2:
        (i) being in a court
        (ii) fighting someone
        (iii) interrogating suspects
        (iv) competing against rivals...

    d. Dimension 3:
        (i) fighting in a war
        (ii) children shouting
        (iii) someone not keeping promises
        (iv) taxi speeding while on board...

    e. Dimension 4:
        (i) children stomping around
        (ii) spouse nagging incessantly

(iii) government extorting heavy tax repeatedly,...

As is shown in (23) above, the dimensional differences in perception of events or states are largely intuitively appealing but at the same time the dimension-event/state association is not rigid but variable. They are intuitively appealing in that the event or the state of affairs being described tend to be strongly tied with the dimensional concept (e.g. semalfactive 'thumping' with 'point' (E^0); 'series' with 'line' (E^1); 'scene' with 'plane' (E^2); 'unavoidable situation' with 'space' (E^3); and 'continuous adverse influence' with 'tesseract container' (E^4). The associations are variable in that an identical event/state may be conceptualized as of different dimensions (e.g. 'fighting' with 'line' (E^1) or 'plane' (E^2) or even 'space' (E^3)). This variability is well illustrated in (24), where *cencayng* 'war' can be associated with a range of dimensionally modulated conceptualization.

(24) Differences in Semantic Nuance by Nominals (examples with *cencayng* 'war' as the causer in a template of "at a DN of a war")

    a. *cham* (E^0) 'opportunity':

       cencayng ha-nun   **cham**-ey
       war   do-Simul.Adn opportunity-at
       'Since we are at a war, [why not take advantage of it?...]'
       (entity; war as an incidental entity that we came across)

    b. *kil* (E^1) 'way':

       cencayng ha-nun   **kil**-ey
       war   do-Simul.Adn   way-at
       'Since we engaged in a war with [Country A, let's attack Country B, too...]'
       (linear; potential enemy countries lined up)

    c. *matang* (E^2) 'field'

       cencayng ha-nun   **matang**-ey
       war   do-Simul.Adn   field-at
       'Since we are in the war, [what's the use of romance?....]'
       (situation; battlefield as a background in evaluation of other events/ actions)

d. *thong* (E^3) 'barrel'
   cencayng ha-nun   **thong**-ey
   war   do-Simul.Adn   barrel-at
   'While we were in a war, [I lost my family and possessions....]'
   (container; war as a container within which I was confined and was
    made helpless)

e. *tungssal* (E^4) 'turmoil'
   cencayng ha-nun   **tungssal**-ey
   war   do-Simul.Adn   turmoil-at
   'While we were in a war, [I could not live an ordinary life...]'
   (tumultuous situation; warring parties constantly exchanging offenses in
    all directions and with all means which constantly harassed me)

As is illustrated in (24), it is evident that the causal force of a 'war'
becomes stronger and thus more unavoidable on the part of the
experiencer. This is a natural consequence because the level of the
'confinedness' of the experiencer increases in proportion to the increase
of the dimensions along the continuum of [point > line > plane >
situation > container].

5.2. Layering

The notion of 'layering' refers to a situation: "within a broad
functional domain, new layers are continually emerging. As this
happens, the older layers are not necessarily discarded, but may remain
to coexist with and interact with the newer layers." (Hopper 1991: 22).
The described situation shows the co-existence of multiple forms in a
paradigm of functional categories, i.e. causal postpositions and causal
connectives, an excellent exemplar of the layering phenomenon.

It is widely known that layered forms of a category exhibit the
division of labor by each form specializing in slightly different sub-
functions (Koo & Rhee 2001). The multiple forms apparently over-
crowding a single paradigm of causality marking connectives or

postpositions are in a division of labor, each gaining the primacy in certain subcategories. In the case of CCs and CPs those subfunctions are related to the elaborate distinctions in the degree of causal force. Therefore, the lowest dimension (E^0) CCs and CPs encode the lowest level of causality, nearly touching on incidentality; whereas the highest dimension (E^4) CCs and CPs encode the highest level of causality, i.e. unescapable and insuperable causal force. This division of labor is closely related to the semantics of the DNs (cf. 'persistence' in 5.3).

5.3. Persistence and Specialization

There is a systematic correlation between the semantics of the source nominals and that of the grammaticalized forms, i.e. the meaning of a particular DN is directly related to the meaning of the CC or CP that developed from the DN. For instance, the semantics of Dimension 0 DNs, such as *cham* 'point', *kim* 'opportunity', *sesul* 'blade', etc., contributes to the meaning of their corresponding CCs and CPs the semantics of which is closely associated with conceptualizing the causal force as an entity the experiencer can be faced with. At the same time this semantic property of E^0 DNs renders the sentence awkward or unnatural if their CCs and CPs are used with a predicate normally compatible with E^4 CCs and CPs. For instance, the subordinate causal clause in the sentence (24e) "While we were in a war, [I could not live an ordinary life]." cannot utilize E^0 DNs as in *Cencayng ha-nun *cham/ *kim/*sesul...-ey*. In general, the dimensional differences can account for the interchangeability and incompatibility among CCs and CPs.

This state of affairs can be described as an instance of 'persistence' (Hopper 1991), which states: "When a form undergoes grammatical-ization from lexical to a grammatical function, so long as it is grammatically viable some traces of its original lexical meanings tend to

adhere to it, and details of its lexical history may be reflected in constraints on its grammatical distribution" (Hopper 1991: 22). This phenomenon also supports the 'source determination hypothesis' by Bybee et al. (1994: 9), which states: "the actual meaning of the construction that enters into grammaticalization uniquely determines the path that grammaticalization follows and, consequently, the resulting grammatical meanings." Furthermore, there is a strong tendency to recruit particular lexemes for the purpose of causality representation, illustrating how human cognition is reflected in grammar (Heine 1997).

5.4. Subjectification

The grammaticalization process often involves subjectification of the language user (Traugott 1982, Traugott & König 1991), whereby meanings tend to become more subjective, or a particular aspect of an event is selected for emphasis (Rhee 2008a).

In the case of causal CCs and CPs, the subjectification process *en route* to grammaticalization is prominent, since the semantics of the resultant grammatical form contains causality while the DNs of all dimensions make reference to certain physical or abstract entities, such as point, blade, field, barrel, etc., and do not make direct reference to cause *per se*, except for the three D^0 DNs *kkatalk* 'cause/reason', *ttaymwun* 'cause/reason', and *thas* 'blame'. Therefore, invoking the notion of causality from 'way', 'sequence', 'ground', 'wind', 'barrel' etc. is an instance of subjectification. This is illustrated in each case of semantic development as schematically represented in (25):

(25) a. E^0 point   'at the point of'   > 'because of'
     b. E^1 line   'on the way of'   > 'because of'
     c. E^2 plane   'on the ground of'   > 'because of'
     d. E^3 space   'within the barrel of' > 'because of'
     e. E^4 tesseract 'within the turmoil of' > 'because of'

6. Conclusion

This paper addressed the grammaticalization of causality-marking grammatical forms in Korean. The causality-marking CCs and CPs making use of DNs of differing dimensions show how elaborately the causal forces are conceptualized in relation to the recipient of the forces.

There are multiple forms in a single paradigm exhibiting a layering phenomenon, but individual forms are specialized differently with delicate shades of meaning that can be captured with the notion of dimension. Depending on the nature and strength of the causal force, language users can choose a particular connective/postposition for linguistic representation. However, there is also a variability in the degree of conventionalization of causality meaning, crucially depending on the dimensions involved.

This paper also showed that semantic change that occurred *en route* to grammaticalization of connectives and postpositions typically involves contextual inferences involving subjectification whereby physical entities and abstract locations are interpreted as the locus of causal forces that affect the experiencer which comes into contact with the entity or becomes situated within the location.

References

Ahn, Hyo-Kyung. 2001. *Hyentaykwukeuy Uyconmyengsa Yenkwu* [A study on bound nouns in modern Korean]. Seoul: Yeklak Publishing.

Ahn, Joo Ho. 1997. *Hankwuke Myengsauy Mwunpephwa Hyensang Yenkwu* [A study of grammaticalization of Korean nouns]. Seoul: Hankuk Publisher.

Bybee, Joan L. 1985. *Morphology: A Study of the Relation Between Meaning and Form.* Amsterdam: John Benjamins.

Bybee, Joan L., Revere Perkins, and William Pagliuca. 1994. *The Evolution of Grammar: Tense, Aspect, and Modality in the Languages of the World.* Chicago:

The University of Chicago Press.

Chae, Sookhee. 2003. Grammaticalization of noun phrase complement construc- tions into conjunctive endings in Korean. *Language Research* 40.1: 59-81.

Danks, David. 2009. The psychology of causal perception and reasoning. In Beebee, Helen, Christopher Hitchcock, and Peter Menzies (eds.) *Oxford Handbook of Causation*, 447-470. Oxford: Oxford University Press.

Diewald, Gabriele. 2011. Grammaticalization and pragmaticalization. In Narrog, Heiko and Bernd Heine (eds.) *The Oxford Handbook of Grammaticalization*, 450-461. Oxford: Oxford University Press.

Heine, Bernd. 1997. *Cognitive Foundations of Grammar*. Chicago: The University of Chicago Press.

Hengeveld, Kees. 2011. The grammaticalization of tense and aspect. In Narrog, Heiko, and Bernd Heine (eds.) *The Oxford Handbook of Grammaticalization*, 580-594. Oxford: Oxford University Press.

Hoffmann, Sebastian. 2005. *Grammaticalization and English Complex Prepositions: A Corpus-Based Study*. New York: Routledge.

Hopper, Paul J. 1987. Emergent grammar. *BLS* 13, 139-157.

Hopper, Paul J. 1991. On some principles of grammaticalization. In Traugott, Elizabeth C., and Bernd Heine (eds.) *Approaches to Grammaticalization*. 2 vols. Vol 1, 17-35. Amsterdam: John Benjamins.

Hopper, Paul J., and Sandra Thompson. 1985. The iconicity of the universal categories "noun" and "verb". In Haiman, John (ed.) *Iconicity in Syntax*, 151-183. Amsterdam: John Benjamins.

Hopper, Paul J., and Elizabeth C. Traugott. 2003. *Grammaticalization* (2nd edition). Cambridge: Cambridge University Press.

Huh, Woong. 1995. *20-seyki Wulimaluy Hyengthaylon* [20th century Korean mor- phology]. Seoul: Saem Publishing.

Ko, Yong-Kun. 1989[1970] *Kuke Hyengtaylon Yenkwu* [A study on Korean morphology]. Seoul: Seoul National University Press.

Koo, Hyun Jung, and Seongha Rhee. 2001. Grammaticalization of a sentential end marker from a conditional marker. *Discourse & Cognition* 8.1, 1-19.

Lakoff, George, and Mark Johnson. 1980. *Metaphors We Live By*. Chicago: The University of Chicago Press.

Lee, Ju-Haeng. 1988. *Hankwuke Uyconmyengsauy Thongsicek Yenkwu* [A diachronic study on Korean defective nouns]. Seoul: Hansaem Publishing.

Lee, Keum-Hee. 2007. The paper on the Korean reason/causative expressions. *Journal of Korean Language Education* 18.2, 243-266.

Minkowski, Hermann. 1908/9. Raum und Zeit, *Physikalische Zeitschrift* 10, 75-88.

Rhee, Seongha. 2008a. Subjectification of reported speech in grammaticalization and lexicalization. *Harvard Studies in Korean Linguistics* 12, 590-603.

Rhee, Seongha. 2008b. The ground in the mind: Subjectification and inter-subjectification in grammaticalization of Korean *the* 'ground'. Paper presented at the 4th New Reflections on Grammaticalization Conference, Catholic University of Leuven, Belgium, July 16-19, 2008.

Rhee, Seongha. 2011. Nominalization and stance marking in Korean. Yap, Foong Ha, Karen Grunow-Hårsta, and Janick Wrona (eds.) *Nominalization in Asian Languages: Diachronic and Typological Perspectives,* 393-422, Amsterdam: John Benjamins.

Sloman, Steven A. 2005. *Causal Models: How People Think About the World and Its Alternatives.* Oxford: Oxford University Press.

Sweetser, Eve Eliot. 1990. *From Etymology to Pragmatics: Metaphorical and Cultural Aspects of Semantic Structure.* Cambridge: Cambridge University Press.

Talmy, Leonard. 1988. Force dynamics in language and cognition. *Cognitive Science* 12, 49-100.

Talmy, Leonard. 1995. The cognitive culture system. *Monist* 78, 80-114.

Traugott, Elizabeth C. 1982. From propositional to textual and expressive meanings: Some semantic-pragmatic aspects of grammaticalization, Lehmann, Winfred and Yakov Malkiel (eds.) *Perspectives in Historical Linguistics,* 245-271. Amsterdam: John Benjamins.

Traugott, Elizabeth C., and Ekkehard König. 1991. The semantics-pragmatics of grammaticalization revisited. In Traugott, Elizabeth C., and Bernd Heine (eds.) *Approaches to Grammaticalization.* 2 vols. Vol. 1, 189-218. Amsterdam: John Benjamins.

Traugott, Elizabeth C., and Richard Dasher. 2002. *Regularity in Semantic Change.* Cambridge: Cambridge University Press.