

How do Degrees Enter the Grammar? Language Change in Samoan from [-DSP] to [+DSP]¹

Vera Hohaus — Eberhard Karls Universität Tübingen

Abstract. The paper presents the result of a diachronic corpus study on Samoan, tracing a recent change in the setting of the Degree Semantics Parameter (Beck et al. 2009). We suggest that an earlier stage, Samoan had a negative setting of said parameter. Appropriation of another scalar concept then paved the way for the introduction of degrees into the grammar. Lexical and syntactic re-analysis of the directional particle *atu* ('forth, away') result in a new parameter setting.

1 Introduction

Languages vary in the semantics of gradable predicates. This variation is captured in the Degree Semantics Parameter in (1). In this paper, we argue that Samoan, a Polynesian language from the Austronesian family has recently undergone a change from [-DSP] to [+DSP].

- (1) DEGREE SEMANTICS PARAMETER [+/-DSP]:
A language {does/ does not} have gradable predicates (type $\langle d, \langle e, t \rangle \rangle$ and related),
i.e. lexical items that introduce degree arguments.
(Beck et al. 2009, p. 19, no. (62))

The paper is structured as follows: The next section briefly reviews the semantics of comparison under the two possible settings of the Degree Semantics parameter. Section 3 provides an overview over the compositional semantics of comparison constructions in present-day Samoan and reviews the evidence for [+DSP]. Section 4 shows that we have evidence for positing an early stage of the language at which it was [-DSP]. We then go on to model this change in section 5. Section 6 concludes with some general remarks about the nature of language change.

2 The Degree Semantics Parameter

In this section, we will briefly review the diagnostics for [+DSP] and sketch a semantics for the comparative under both parameter settings. For more extensive discussion, see Beck et al. (2009), Bochnak (2013), Bochnak & Bogal-Allbritten (2015), and Bowler (2016). For an introduction to degree semantics, see Beck (2011).

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Functional degree morphology used in a variety of comparison constructions like English (2) to (4) is indicative of a degree semantics. A differential comparative construction (DiffComp), however, requires a degree-based analysis. Let us briefly explain why.

- (2) a. *C.J. is taller_c.* (Contextual Comparative, ContextComp)
 b. *C.J. is four inches taller than Josh.* (Differential Comparative, DiffComp)
 c. *C.J. is taller than 6ft.* (Comparison with a Degree, DegComp)
- (3) a. *Sam is as tall as Leo.* (Equative, Eq)
 b. *C.J. is the tallest.* (Superlative, Sup)
- (4) a. *How tall is Josh?* (Degree Question, DegQ)
 b. *Charlie is 5'8" tall.* (Measure Construction, MeasC)
 c. *Leo is this tall, too.* (Pronominal Measure Construction, PMeasC)

Under degree-based accounts, under which the lexical entry of a gradable adjective like English *tall* is (5) (or related, see, e.g. Svenonius & Kennedy 2006), the analysis of the DiffComp is straightforward, as addition and subtraction of degrees are easily definable (see also Stechow 2008). A sample lexical entry for a phrasal differential comparative operator inspired by Bhatt & Takahashi (2011) is in (6). In (7), we sketch the interpretation of (2-b) using this operator.

- (5) $\llbracket tall_{[+DSP]} \rrbracket = \lambda d. \lambda x. HEIGHT(x) \geq d$ (type $\langle d, \langle e, t \rangle \rangle$)
- (6) $\llbracket -er_{(phrasal, differential)} \rrbracket = \lambda d. \lambda y. \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. MAX(\lambda d'. R(d')(x) = 1) \geq MAX(\lambda d''. R(d'')(y) = 1) + d$
- (7) $\llbracket [C.J. \llbracket [-er \ 4 \ in] \llbracket [than \ Josh] \rrbracket tall_{\langle d, \langle e, t \rangle \rangle} \rrbracket] \rrbracket = 1$ iff $\llbracket [-er] \llbracket (4 \ in)(J) \llbracket tall \rrbracket \rrbracket (C.J.) = 1$
 iff $MAX(\lambda d. HEIGHT(C.J.) \geq d) \geq MAX(\lambda d'. HEIGHT(J) \geq d') + 4 \ in$
 ‘The maximal degree d such that C.J. is d -tall exceeds
 the maximal degree d' such that Josh is d' -tall by at least four inches.’

Differential measure phrases are however well known to be problematic for vague predicate-approaches in the spirit of Klein (1980), which do not employ degrees (see the discussion in Stechow 1984a,b). A simplified degreeless lexical entry for a gradable adjective is in (8). With respect to a contextually provided comparison class C (a set of individuals), the adjective partitions its domain into two sets, those considered tall and those who are considered not tall. We can then define a phrasal comparative operator as in (9), which generates the interpretation in (10) for a simple comparative.

- (8) $\llbracket tall_{[-DSP]} \rrbracket^C = \lambda x. x$ counts as tall with respect to C (type $\langle e, t \rangle$)
- (9) $\llbracket -er_{(phrasal)} \rrbracket = \lambda y. \lambda R_{\langle e, t \rangle}. \lambda x. R(x) = 1 \ \& \ R(y) = 0$
- (10) $\llbracket [C.J. \llbracket tall \llbracket [-er \llbracket [than \ Josh] \rrbracket] \rrbracket] \rrbracket^C = 1$ iff $\llbracket tall \rrbracket^C(C.J.) = 1 \ \& \ \llbracket tall \rrbracket^C(J) = 0$
 iff $C.J.$ counts as tall with respect to C & J doesn't count as tall in C

Considering the semantics for the comparative in (9) and the compositional interpretation in (10), it is however unclear how to analyze the meaning contribution of a differential measure phrase. Vague-predicate approaches are thus only suitable if a language lacks DiffComp.

3 Comparison constructions in present-day Samoan

Crucially, present-day Samoan (PDS) has DiffComp and is [+DSP] (Hohaus 2010, 2012, 2015). In the terminology of Stassen (1985)’s typology, the comparative construction in PDS is a particle comparative that allows for ContextComp, DegComp, and DiffComp, as illustrated in (11) to (13).²

- (11) *E umi atu Malia.* (ContextComp)
TAM tall DIR. Mary
‘Mary is taller.’
- (12) *E umi atu Malia i le lima futu.* (DegComp)
TAM tall DIR. Mary PREP. the five foot
‘Mary is taller than 5ft.’
- (13) *E umi atu Malia i le lua inisi i lo lona uso.* (DiffComp)
TAM tall DIR. Mary PREP. the two inch PREP. COMP. POSS.3.sg. sister
‘Mary is two inches taller than her sister.’

Outside of comparatives, the directional particle *atu* also combines with motion predicates like *alu* (‘to go’) to indicate movement away from a contextually determined location like the starting point of the event or the position of the speaker. An example is in (14).

- (14) *Ua alu atu Sina.*
TAM(inch.) go DIR. Sina
‘Sina has just left.’

Villalta (2007) and Hohaus (2010, 2012, 2015) conclude from their analyses of data like (11) to (13) that Samoan employs a degree semantics. Predicates like *umi* (‘tall’) are thus analyzed like their English counterparts, see (15-a). We follow Hohaus (2015) in analyzing the particle *atu* in comparatives (below referred to as comparison-*atu*, as opposed to motion-*atu* in (14)) as a contextual comparative operator with an optional differential degree argument, as (15-b).³

- (15) a. $\llbracket \textit{umi} \text{ (‘tall’) } \rrbracket = \lambda d. \lambda x. \text{HEIGHT}(x) \geq d$ (type $\langle d, \langle e, t \rangle \rangle$)
- b. $\llbracket \textit{comparison-atu} \rrbracket^c = \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. \text{MAX}(\lambda d. R(d)(x) = 1) > c$
 $\llbracket \textit{comparison-atu}_{\text{(differential)}} \rrbracket^c = \lambda d. \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. \text{MAX}(\lambda d. R(d)(x) = 1) \geq c + d$
- c. $\llbracket \text{MAX} \rrbracket = \lambda D_{\langle d, t \rangle}. \iota d [\forall d' \in D : d \geq d']$

Under this analysis, the compositional interpretation of the contextual comparative in (11) proceeds along the lines of (16), where the context provides some degree *c* as the comparison standard.

- (16) $\llbracket [\textit{Mary} [\textit{tall}_{\langle d, \langle e, t \rangle \rangle} \textit{comparison-atu}]] \rrbracket^c = 1$ iff

²Abbreviations used in glosses include COMP. = marker of comparison standard, CON. = connective, DEM. = demonstrative, DIR. = directional particle, EMPH. = emphatic marker, FOC. = focus marker, inch. = inchoative, neg. = sentential negation, pl. = plural, HUM. = prefix for counting humans, POSS. = possessive, PREP. = preposition, PRN. = pronoun, sg. = singular, and TAM = tense-aspect marker.

³Under this analysis, the *i lo*-phrase in (13) is not an argument of the comparative operator but is treated as a frame setter that indirectly manipulates the contextual standard of the comparison (see Hohaus 2015, pp. 118-127).

$$[\lambda R_{\langle d, \langle e, t \rangle \rangle}. [\lambda x. \text{MAX}(\lambda d. R(d)(x) = 1) > c]](\lambda d. \lambda x. \text{HEIGHT}(x) \geq d)(M) = 1$$

iff $\text{MAX}(\lambda d. \text{HEIGHT}(M) \geq d) > c$

‘The maximal degree d such that Mary is d -tall exceeds some contextually provided height degree.’

Even though Samoan employs a degree semantics under this analysis, it differs from other [+DSP] languages like English in two respects, (i), the inventory of comparison constructions, and (ii), the interpretation of the unmarked form of the gradable predicate.

The inventory of comparison constructions. Samoan lacks functional morphology for other degree constructions like Eq and Sup and does not allow for DegQ, MeasC and PMeasC (Beck et al. 2009; Villalta 2007; Hohaus 2010, 2012, 2015). Relevant examples are provided in (17) to (18). See the references cited for grammatical alternatives to all these constructions without the degree predicate.

- (17) a. **E umi tutusa Malia ma Ioane.* (*Eq)
 TAM same(pl.) Mary and John
 (Intended:) ‘Mary is as tall as John.’
- b. **E aupito umi Miriama.* (*Sup)
 TAM absence.of+next tall Miriam
 (Intended:) ‘Miriam is the tallest.’
- (18) a. *‘*O le ā umi Malia?*’ (*DegQ)
 FOC. the what tall Mary?
 (Intended:) ‘How tall is Mary?’
- b. **E umi Malia le lima futu.* (*MeasC)
 TAM tall Mary PREP. the five foot
 (Intended:) ‘Mary is five foot tall.’
- c. **E umi foi Malia lea.* (*PMeasC)
 TAM tall also Mary DEM.sg.
 (Intended:) ‘Mary is this tall, too.’

The interpretation of bare adjectives. Hohaus (2015, pp. 118-147) additionally reports variation in the interpretation of the morphologically unmarked (positive) form of the degree predicate. Compare the judgments for English and Samoan in (19) and (20).

- (19) a. Picture context: A picture displaying five very lean men and two obese men, John and Joseph. It is clear that Joseph however weighs even more than John.
- b. #*E puta Ioane.* c. *E puta Iosefo.* d. {*John/Joseph*} is fat.
 TAM fat John TAM fat Joseph
 ‘John is the fattest.’ ‘Joseph is the fattest.’
- (20) a. Picture context: A photo of two basketball players, Mary (6ft) and John (6ft 2in).
- b. #*E umi Malia.* c. *E umi Ioane.* d. {*Mary/John*} is tall.
 TAM tall Mary TAM tall John
 ‘Mary is the tallest.’ ‘John is the tallest.’

Hohaus (2015) suggests to capture this variation by positing a covert operator for the positive form in Samoan that is essentially a superlative, (21). The compositional interpretation of (20) is sketched in (22). Crucially, under this analysis, Mary needs not be considered tall against some standard of tallness derived from the comparison class, but her height is required to exceed that of everyone else in the comparison class, which in this case is only John.

$$(21) \quad \llbracket \text{Op} \rrbracket^C = \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. \forall y [y \in C \ \& \ y \neq x \\ \rightarrow \text{MAX}(\lambda d. R(d)(x) = 1) > \text{MAX}(\lambda d'. R(d')(y) = 1)]$$

$$(22) \quad \llbracket [\text{Mary} \llbracket \llbracket \text{tall}_{\langle d, \langle e, t \rangle \rangle} \text{Op} \rrbracket] \rrbracket^C = 1 \text{ iff} \\ \llbracket \text{Op} \rrbracket^C (\lambda d. \lambda z. \text{HEIGHT}(z) \geq d)(M) = 1 \text{ iff} \\ \forall y [y \in C \ \& \ y \neq M \rightarrow \text{MAX}(\lambda d. \text{HEIGHT}(M) \geq d) > \text{MAX}(\lambda d'. \text{HEIGHT}(y) \geq d')]$$

‘For all individuals y in the contextually provided comparison set C but Mary, the maximal degree d such that Mary is d -tall exceeds the maximal degree d' such that y is d' -tall.’

Further support for this analysis comes from the behavior of additives like *fo'i* (‘also’). In the context provided in (23), both Mary and Temukisa are quite tall. It is also true that Temukisa is taller than Mary. Crucially, though, in PDS, I cannot follow up on such a comparison by saying that Mary is tall, unlike in English.

- (23) a. Context: Mary’s height: 185 centimeter, Temukisa’s height: 190 centimeter
 b. *E umi atu Temukisa i lō Malia. #‘Ae e umi fo’i Malia.*
 TAM tall DIR. Temukisa PREP. COMP. Mary but TAM tall also Malia
 ‘Temukisa is taller than Mary. But Mary is also tall.’

Interim summary. To summarize this brief overview of the grammar of comparison in PDS: The availability of a DiffComp provides evidence that Samoan is [+DSP] and has a degree semantics. In terms of degree operators, we have argued that PDS has a contextual comparative operator, which optionally takes a differential degree argument, and a covert superlative-like operator, which is used in the interpretation of the positive form of the degree predicate. These key ingredients of the grammar of comparison in PDS are summarized again below.

- (24) The grammar of comparison in present-day Samoan:
- parameter setting: [+DSP]
 $\llbracket (\text{gradable predicate}) \rrbracket \in D_{\langle d, \langle e, t \rangle \rangle}$
 - inventory of degree operators in functional lexicon:
 $\llbracket \text{comparison-atu} \rrbracket^c = \lambda R_{\langle d, \langle e, t \rangle \rangle}. \text{MAX}(\lambda d'. R(d')(x)) > c$
 $\llbracket \text{comparison-atu}_{(\text{differential})} \rrbracket^c = \lambda d. \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. \text{MAX}(\lambda d. R(d)(x) = 1) \geq c + d$
 $\llbracket \text{Op} \rrbracket^C = \lambda R_{\langle d, \langle e, t \rangle \rangle}. \lambda x. \forall y [y \in C \ \& \ y \neq x \\ \rightarrow \text{MAX}(\lambda d. R(d)(x) = 1) > \text{MAX}(\lambda d'. R(d')(y) = 1)]$

Both, the fact that PDS lacks any other comparison constructions apart from the particle comparative and the fact that the particle *atu* may occur with degree as well as motion predicates, raise the question whether this comparative construction and thus the [+DSP] setting are a recent innovation.

4 Comparison constructions in Early Written Samoan

Data indicative of such a change in parameter setting come from three sources, early descriptions of the language (section 4.2), synchronic variation in acceptability (section 4.3), and a quantitative study on a corpus of written texts from the 19th century and on a corpus from the 21st century (section 4.4). The next section provides some historical background on the language.

4.1 Historical background

The Samoan archipelago was settled approximately 3,500 years ago.⁴ The written record of the islands however starts much later, in 1834, when missionaries from the London Missionary Society develop a writing system for the language based on the Latin script. The first bible translation, a dictionary and a brief grammatical description all were published in 1862 by George Pratt, followed by a first wave of other publications on and in the Samoan language. We will focus here on the period until the early 20th century, when the islands – as a result of the conflicting colonialist interests of the United Kingdom, Germany and the United States (and much civil unrest) – were partitioned into two protectorates, the Germany colony of Western Samoa and an American protectorate. We will refer to the language in this period as Early Written Samoan (EWS).

4.2 Early grammars

Crucially, none of the philological descriptions of EWS mentions the particle comparative described above (see also Stassen 1985, pp. 330-331). Neffgen (1903, pp. 7-8) even explicitly comments on the unavailability of English-like comparison constructions: „Eine eigentliche Komparation kennt der Samoaner nicht. . . Mitunter gebraucht der Samoaner überhaupt keine Steigerung, besonders dann, wenn keine Verwirrung oder Verwechslung entstehen kann.“⁵

EWS appears to have used a conjoined comparative construction, a hallmark of degreeless languages. Funk (1893, p. 3) characterizes this construction as follows: „Bei der Komparation wird das Eigenschaftswort nicht gesteigert, sondern es werden zur Bildung des Komparativs zwei Adjektiva, von denen das eine das Gegenteil des anderen bedeutet, im Positiv zusammengestellt.“⁶ Pratt (1862, p. 8) writes: “Comparison is generally affected by using two adjectives, both in a positive state not in itself, but in comparison with the other.” He provides the example in (25).

- (25) *E lelei lenei, a e leaga lela.*
 TAM good this but TAM bad that
 ‘This is good, but this is bad.’ (Pratt 1862, p. 8)

We conclude from this survey of the philological literature that EWS lacked the particle comparative construction of PDS that provides a crucial diagnostic for categorizing Samoan as [+DSP].

⁴See *A History of American Samoa* (Honolulu: Bess Press, p. 21) by the Amerika Samoa Humanities Council.

⁵Translation: “The Samoan does not have a comparison proper. Frequently, the Samoan does not use any comparison morphology, especially when no confusion or misinterpretation can occur.”

⁶Translation: “For a comparison, the adjective does not change. Instead, two adjectives of which one means the opposite of the other are put together in the Positive.”

The particle comparative is first mentioned in Holmer (1966, p. 27), who reports that “. . . it is generally stated that the comparative degree in the Polynesian languages is expressed by placing any of the local adverbs *ake* (‘up’) or *atu* (‘away, beyond’) after the adjective.” As a dispreferred strategy, conjoined comparatives are however reported as late as Marsack (1975, p. 66), who provides the example in (26). The example is also relevant because it shows that in their bare, positive form, predicates like *laitiiti* (‘small’) are not evaluative (in the sense of Rett (2015)), that is, they do not make reference to an independent standard for size.

- (26) a. Even in the case of giant vessels like the Queen Mary and the Aquitania this construction would be used. To indicate that the 85,000-ton Queen Mary is bigger than the 45,000-ton Aquitania, a Samoan of the old school would say:
- b. *‘Ua telē le Queen Mary, ‘ua la‘itiiti le Aquitania.*
 TAM(inch.) big the Queen Mary TAM(inch.) small the Aquitania
 ‘The Queen Mary is big, the Aquitania is small.’

Later grammatical descriptions do not mention the conjoined comparative anymore (Hunkin 1992, Mosel & Hovdhaugen 1992, Mosel & So’o 1997), suggestion that it fell out of use.

4.3 Synchronic variation

If the particle comparative (and the loss of the conjoined comparative construction) is an innovation that dates back no more than a century, we might expect to see this change reflected in synchronic variation in acceptability when it comes to conjoined comparatives (see, e.g., Roberts & Roussou 2003, p. 236). And indeed, the construction is not consistently accepted by speakers of PDS. We discuss two exemplary cases here, the acceptability judgments pertaining to (27) and (28).

In an informal questionnaire study with six speakers, the target sentence in (27) was judged acceptable only by three speakers. One speaker rejects the sentence, while the remaining two find it only maybe acceptable. One such participant suggests to use the particle comparative instead. The example in (28) is an item from a questionnaire study with nine speakers, of which six found the conjoined comparative acceptable in this context. Two participants judged the target sentence unacceptable and one wasn’t sure as to its acceptability. The latter as well as a speaker who had judged the conjoined comparative acceptable additionally expressed a preference for the particle comparative in their comments.

- (27) a. Context: The tallest family members I have are my aunt Sulu and my brother Alofa. Both are quite tall. Sulu’s height is 6’2”. Alofa is even 6’4” tall.
- b. *E maualuga Alofa, e puupuu Sulu.*
 TAM high Alofa TAM small Sulu
 ‘Alofa is tall, Sulu is small.’
- (28) a. Picture context: A Lego family with two children, Mary who is indicated to be three years of age and John who is indicated to be five years of age.
- b. *E matua Ioane ae laititi Malia.*
 TAM old John but young Mary
 ‘John is old, but Mary is young.’

We hypothesize that the observed variation in the acceptability of conjoined comparatives in PDS is a result of language change from [-DSP] to [+DSP], a change that was triggered (as we will spell out in section 5) by the introduction of the particle comparative. This change made the conjoined comparative construction superfluous.

4.4 The corpus study

Under this hypothesis, the particle comparative is a recent innovation in the language. Given the facts in PDS, it is conceivable that comparison-*atu* diachronically derived from motion-*atu*. The available philological literature reviewed in section 4.2 plausibly suggest that EWS constitutes a language stage at which the particle had not yet taken on this double duty, but was used only with motion predicates. In this section, we report the results of a corpus study in which we compare the frequency of comparison-*atu* in a corpus of EWS to its frequency in a corpus of PDS. The results strongly suggest that EWS had not yet acquired comparison-*atu*.

Methodology. For the study, we constructed a corpus of Early Written Samoan from seven texts published between 1849 and 1900. The only criteria for inclusion in the corpus were the publication date (as early as possible) and the accessibility of the text. Table 2 provides an overview over the corpus. Note that four of the texts are translations into Samoan. In all those cases, second language speakers of Samoan were in charge of the translations, but, judging from the reports of several missionaries (see, e.g., Lundie Duncan 1846; Turner 1861, 1884), native speakers were usually extensively involved in the preparation of the manuscript. In the absence of any other publications in the language from the mid-19th century, we felt that the inclusion of those texts in the corpus was nevertheless warranted.

short reference	description
<i>Mataio</i> (1849)	Gospel of Matthew from a translation of the New Testament, published by the British and Foreign Bible Society in London
<i>Kenese</i> (1862)	Book of Genesis from the first Bible translation, published by the British and Foreign Bible Society in London
Violette (1875)	translation of a popular German religious textbook by Ignaz Schuster
Pratt (1890)	translation of popular fables by missionary George Pratt
Stübel (1896)	collection of 111 short Samoan stories collected between 1889 and 1891 by German diplomat Oscar W. Stübel
Fraser (1898)	five Samoan stories and songs from the archives of missionary George Pratt originally collected by missionary Thomas Powell
Sierich (1900)	collection of Samoan stories by German lawyer F. Otto Sierich

Table 1: Corpus of Early Written Samoan

Unfortunately, comparatives are not a highly frequent construction. For English, Hohaus, Tiemann & Beck (2014) find an average of approximately five comparatives per 1,000 utterances in a corpus study of adult care giver speech. A low proportion of comparison-*atu* in the EWS corpus can thus only be a meaningful indicator of language change if it is considerably lower

than the frequency with which we find it in present-day Samoan. For purposes of comparison, we therefore also constructed a corpus of PDS built from eight short books for children and young adults, published between 2004 and 2017 (Salesa 2004, Wai 2012a,b, Carlie & Chu Ling-So‘o 2013, Wai 2014, Va‘afusuaga 2016). The corpus additionally included 854 posts from the online edition of the Samoana section of the *Samoan Observer*⁷ and from the *Samoa Times*⁸ published between December 2016 and October 2017. The posts included a large number of sermons (and were thus close in genre to some of the texts in the EWS corpus).

We conducted a manual search of the EWS corpus for occurrences of *atu*, which were then categorized for use as motion-*atu*, comparison-*atu*, or as unclear. Unclear cases comprise cases of structural ambiguity in which the context did not allow us to decide between motion-*atu* and comparison-*atu* as well as cases where the translation of the sentence was unclear. Within the PDS corpus, we performed a computerized search of the news items and a manual search of books for occurrences of *atu*, which were then again categorized according to the above classification.

Results and Statistical Analysis. Tables 2 and 3 report the results of the search on the respective corpora. While there are no clear cases of comparison-*atu* in the EWS corpus among the more than 3,500 occurrences of the particle, comparison-*atu* accounts for 7.22 percent of the 2,007 hits in the PDS corpus. An example of motion-*atu* from the EWS corpus is in (29). Examples of motion-*atu* as well as comparison-*atu* from the PDS corpus are in (30) and (31).⁹ (See (34) below for an example categorized as unclear.)

source	# total	# motion	# comparison	# unclear
<i>Mataio</i> (1849)	723	721	0	2
<i>Kenese</i> (1862)	821	820	0	1
Violette (1875)	1002	994	0	8
Pratt (1890)	155	155	0	0
Stübel (1896)	954	953	0	1
Fraser (1898)	0	0	0	0
Sierich (1900)	76	76	0	0
total	3,731	3,719 (99.68%)	0 (0.00%)	12 (0.32%)

Table 2: Results of search in the EWS corpus

source	# total	# motion	# comparison	# unclear
book publications	48	40 (83.33%)	8 (16.67%)	0 (0.00%)
newspaper items	1,959	1,809 (92.39%)	136 (6.95%)	13 (0.66%)
total	2,007	1,849 (92.13%)	144 (7.22%)	13 (0.65%)

Table 3: Results of search in the PDS corpus

⁷The *Samoan Observers* is an Apia-based newspaper with a daily print edition. Its online edition is available at <<http://www.samoobserver.ws/>>. Last accessed November 16, 2017.

⁸The *Samoa Times* is an Auckland-based weekly community newspaper whose online edition is available at <<http://www.samoatimes.co.nz/>>. Last accessed November 16, 2017.

⁹The latter examples are from T. Aruna Loiani, “Olaga tausi aiga o le tina ia Ana,” *Samoa Observer* (July 24, 2017) and V. Maiava & S. Sanerivi, “Fa‘aaoga tataou lou taule‘ale‘a,” *Samoa Observer* (January 4, 2017), respectively.

- (29) *ua [o atu] Leaga ma le fanau i le po...*
 TAM(inch.) go(pl.) Leaga and the offspring PREP. the night
 ‘Leaga and his family had left during the night...’ (Stübel 1896, p. 23)
- (30) *O le tasi o ona alo o lo’o [malaga atu] i Savaii.*
 FOC. the first of 3sg. child(pol.) TAM(ipfv.) travel DIR. to Savaii
 ‘His oldest child is travelling to Savaii.’
- (31) *E leai lava se nofoaga e [sili atu] nai lo’o Samoa,...*
 TAM neg. EMPH. any dwelling TAM good DIR. from COMP. Samoa
 ‘There’s absolutely no better place to live than Samoa...’

The observed difference in proportion of comparison-*atu* between EWS and PDS is highly significant ($p < .0001$, two-tailed Fisher’s exact test). We interpret this result to mean that EWS lacked comparison-*atu* and thus the particle comparative.

Interim Summary. Taken together, the early descriptions of the language, the synchronic variation in the acceptability of conjoined comparatives, and the results of the corpus study allow for a characterization of EWS as in (32).

- (32) The grammar of comparison in Early Written Samoan (EWS):
- a. parameter setting: [-DSP]
 - b. inventory of degree operators in functional lexicon: \emptyset

So far then, Samoan is the only language for which we have evidence for a change in the [+/- DSP] parameter setting. This change appears to have taken place within the last one hundred years.¹⁰ In the next section, we will analyze the individual developmental steps, lexical and syntactic, that are necessary to go from the grammar of EWS in (32) to the grammar of PDS in (24). For this analysis, a certain type of examples classified as unclear in our corpus search will be relevant, which is why we discuss them below. We will then move on to section 5.

Unclear Corpus Examples. While the number of unclear cases is extremely low in both corpora, we consider a certain type of ambiguous example relevant for the compositional analysis of the development of comparison-*atu* from motion-*atu*. Several occurrences of the particle were classified as unclear because of surface ambiguities that were not resolved by the immediate context. Those ambiguities arise when a verb is followed by both, an adverb and the directional particle as in (34). Here, the surface syntax is compatible with the two underlying structures in (33).

¹⁰Given the data discussed in this paper, we however cannot provide a more precise timeline of this change.

- (33) a. [[V Adv] motion-*atu*]
 b. [V [Adv comparison-*atu*]]
- (34) a. Context: The pharaoh learns about the beauty of Abram’s wife Sarai.
 b. *Ona [agalelei atu] lea o ia ia Aperamo...*
 CON. treat+well DIR. DEM.sg. FOC. PRN. PREP. Abraham
 ‘So he [= the pharaoh] treated Abram well...’ (Kenese/Gn. XII:16)

In (34), under the first structure, the pharaoh’s treatment is directed towards Abram (motion-*atu*)¹¹, and he treats him well (or better than anybody else, depending on the interpretation of the positive form). The second structure would generate a reading where the pharaoh – as a consequence of learning how beautiful Sarai is – treats her husband better than before. Crucially, the relevant bible chapter under our reading is compatible with both interpretations. We will argue that this type of surface ambiguities was essential for the introduction of comparison-*atu* into the grammar.

5 Modeling the change in parameter setting

Our starting point for this section is the semantics of motion-*atu* as used in EWS and PDS (section 5.1). An analysis of the changes involved in the development of a degree semantics in Samoan will have to address three questions: Which lexical and syntactic changes underlie the development of comparison-*atu* from motion-*atu*? How does a predicate of type $\langle d, \langle e, t \rangle \rangle$ develop from type $\langle e, t \rangle$? How does this change bring about the covert operator that PDS employs for the interpretation of the positive form? As we have not yet looked at the interpretation of the positive form in the EWS corpus, our focus in this paper will be on the first question (section 5.2).

5.1 Directed motion in EWS and PDS

Building on Hohaus (2010, 2012), we adopt an analysis of motion-*atu* under which it operates on paths. We can conceptualize paths as sequences of locations $(l_0, l_1, l_2, \dots, l_n)$ whose length exceeds 1 (but see also Cresswell 1978, Piñón 1993, Krifka 1998, a.o.). Verbs of motion like *alu* (‘to go’) do not only describe a manner of motion (*i.e.* walking, as opposed to running), but also relate an entity to its movement paths (type l). We will be working with the lexical entry in (35).

- (35) $\llbracket alu \text{ (‘go’)} \rrbracket = \lambda p. \lambda x. x \text{ walks along } p$ (type $\langle l, \langle e, t \rangle \rangle$)

Intuitively, in examples like (36), motion-*atu* introduces an additional requirement of directionality on the path described by a motion predicate: It requires of every non-initial location l_1, \dots, l_n in the movement sequence that it be further away from the sequence’s initial location l_0 than the next lower ranked location in the sequence, l_{n-1} , see also the figure. The paths that make a sentence with motion-*atu* true thus consist of totally ordered sets of locations. We adopt the lexical entry in (37), under which motion-*atu* quantifies off the path argument of the verb.

¹¹This type of use of motion-*atu*, where the motion path is somewhat more abstract, is very frequent in Samoan (see also Hohaus 2010). The most common usage is probably with verbs of speech like *fai* (‘say’) and *tali* (‘reply’).

- (36) *Ua alu atu Sina.*
 TAM(inch.) go DIR. Sina
 ‘Sina has just gone away.’



- (37) $\llbracket \text{motion-}atu \rrbracket = \lambda R_{\langle l, \langle e, t \rangle \rangle}. \lambda x.$ (type $\langle \langle l, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$)
 $\exists p [R(p)(x) = 1 \ \& \ \forall l [l \in p \ \& \ l \neq \text{beg}(p) \rightarrow l >_{\mathfrak{R}} \text{pre}(l)]]$
 ‘For any $R \in D_{\langle l, \langle e, t \rangle \rangle}$ and $x \in D_e$, $\llbracket \text{motion-}atu \rrbracket(R)(x) = 1$ iff there is a path p that makes $R(p)(x)$ true, and for every non-initial location l in this sequence of locations, l is ranked higher with respect to \mathfrak{R} -scale than its immediate predecessor location.’

For any location l , the underlying order \mathfrak{R} is defined as a distance measure from the beginning of the path, $\text{DISTANCE}(l, \text{beg}(p))$. The beginning of a path $\text{beg}(p)$ is the location l such that there is no other location that precedes l . For any location l , $\text{pre}(l)$ returns the next lower ranked location in the movement sequence.

Applied to our example sentence, this analysis derives the truth conditions in (38). The sentence is true if and only if Sina walked further and further away from where she started. Somewhat more precisely, for every non-initial location in the path that Sina walked, Sina’s distance to the beginning of the path increases compared to its immediate predecessor in the sequence.

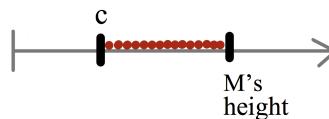
- (38) $\llbracket [\text{Sina} [\text{walk motion-}atu]] \rrbracket = 1$ iff
 $\llbracket \text{motion-}atu \rrbracket(\lambda p. \lambda x. x \text{ walked along } p)(S) = 1$ iff
 $\exists p [S \text{ walked along } p \ \& \ \forall l [l \in p \ \& \ l \neq \text{beg}(p) \rightarrow l >_{\mathfrak{R}} \text{pre}(l)]]$

The directed movement path which *motion-atu* describes shares all important structural properties of a degree scale. We would like to suggest that this shared conceptual structure allowed for a lexical re-analysis of *motion-atu* (type $\langle \langle l, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$) as a comparative operator of type $\langle \langle d, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$. We spell this idea out in the next section.

5.2 Lexical and syntactic steps in the development of *comparison-atu*

How can we model the development of *comparison-atu* from (37), both in terms of lexical semantics and in terms of syntax? Degree comparison shares all the conceptual properties of directed movement as defined in (37). To see this, consider (39) again. The difference between Mary and the contextually provided comparison standard c on the height scale is a directed path (of degrees, rather than locations in space): The comparison standard is its beginning (and Mary’s height is its end point). Given the nature of the height scale, it is indeed also true that every non-initial element of this set of degrees is further away from the beginning of this differential measurement path than the element that immediately precedes it. We would like to suggest that *motion-atu* in EWS therefore allowed for a generalization from locations in a directed movement path to degrees: Both are abstract entities that are totally ordered. Such a transfer might have resulted in a lexical entry for *comparison-atu* along the lines of (40).

- (39) *E umi atu Malia.*
 TAM tall DIR. Mary
 ‘Mary is taller.’



(40) step 1a: type transfer from locations to degrees

For any $R \in D_{\langle d, \langle e, t \rangle \rangle}$ and $x \in D_e$, $\llbracket \text{comparison-}atu \rrbracket^c(R)(x) = 1$ iff
 $\exists D [D = \{d : d \geq c \ \& \ d \leq \text{MAX}(\lambda d. R(d)(x) = 1)\} \ \& \ |D| > 1$
 $\ \& \ \forall d'' [d'' \in D \ \& \ d'' \neq c \rightarrow d >_{\mathfrak{R}} \text{pre}(d)]]$

Let's dissect this lexical entry a little: The movement path of motion-*atu* is the set of difference degrees D , our red dots in the diagram in (39). Just like paths are sequences of a length greater than 1, this set must have a cardinality greater than 1. The counterpart to the beginning of the path here is the contextually provided degree c , the standard of the comparison.

As degrees are by definition elements of a linearly ordered set, the ordering requirement expressed by the last conjunct in (40) will always be met. We can therefore re-write (40) as (41-a), which is equivalent to (41-b). We remain agnostic here as to when in this developmental sequence the differential degree argument that PDS comparison-*atu* allows for was introduced.

(41) step 1b: simplification

- a. For any $R \in D_{\langle l, \langle e, t \rangle \rangle}$ and $x \in D_e$, $\llbracket \text{comparison-}atu \rrbracket^c(R)(x) = 1$
iff $\exists D [D = \{d : d \geq c \ \& \ d \leq \text{MAX}(\lambda d. R(d)(x) = 1)\} \ \& \ |D| > 1]$
- b. For any $R \in D_{\langle l, \langle e, t \rangle \rangle}$ and $x \in D_e$, $\llbracket \text{comparison-}atu \rrbracket^c(R)(x) = 1$
iff $\text{MAX}(\lambda d. R(d)(x) = 1) > c$

While the conceptual similarities between directed motion and comparison made the shift from locations to degrees in the semantics of motion-*atu* possible in the first place, the introduction of comparison-*atu* must have occurred in tandem with a change in the lexical semantics of predicates like *umi* ('tall'). It would however also have required that the language provide the right kind of syntactic environment to support both lexical changes.

Sentences like (42) from above, categorized as unclear in the EWS corpus, provide this kind of environment because of their potential surface ambiguity.

(42) *Ona [agalelei atu] lea o ia ia Aperamo...*
CON. treat+well DIR. DEM.sg. FOC. PRN. PREP. Abraham
'So he [= the pharaoh] treated Abram well. . . ' (Kenese/ Gn. XII:16)

The string consisting of a motion verb, a gradable predicate and the directional particle supports a re-analysis from motion-*atu* to comparison-*atu*, as sketched in (43).

(43) step 2: syntactic re-analysis of surface ambiguities

$\llbracket [(\text{verb}) (\text{adverb}_{\langle e, t \rangle})] (\text{motion-}atu) \rrbracket \rightsquigarrow \llbracket [(\text{verb}) [(\text{adverb})_{\langle d, \langle e, t \rangle \rangle} (\text{comparison-}atu)] \rrbracket]$

Crucially, though, comparison-*atu* operates on degree scales and requires that its first argument be of type $\langle d, \langle e, t \rangle \rangle$. The addition of comparison-*atu* to the functional lexicon of Samoan will thus have been accompanied by a change in parameter setting from [-DSP] to [+DSP]. We don't believe that this change was "an abrupt change in grammars, reflecting a new parameter setting" (Lightfoot 1997, p. 171), but rather would have been a result of decomposition of a degreeless predicate into a predicate of type $\langle d, \langle e, t \rangle \rangle$ and the covert superlative-like operator that we find in PDS.

6 Concluding remarks

In Samoan, then, degrees enter the grammar through two well-known mechanisms of language change, borrowing from another domain and syntactic re-analysis of a potentially ambiguous surface string. Typological data suggest that borrowing from the spatial domain is very frequent in comparison constructions across languages (Stassen 1985). Interestingly, however, we are not aware of languages where the comparative is modeled after the temporal domain.

The resulting transition from [-DSP] to [+DSP] raises some interesting questions about the nature of semantic change. Language change is often argued to be “cyclical change” (Gelderen 2016, p.4) or to resemble a spiral. The change from [-DSP] to [+DSP] however seems to be directional. Roberts & Roussou (2003) suggest to capture such directionality as markedness of one parameter setting over another. They also hypothesize that parametric change is mediated through the introduction of new functional heads. In the case of the transition from [-DSP] to [+DSP], this functional head is the degree head, comparison-*atu*.

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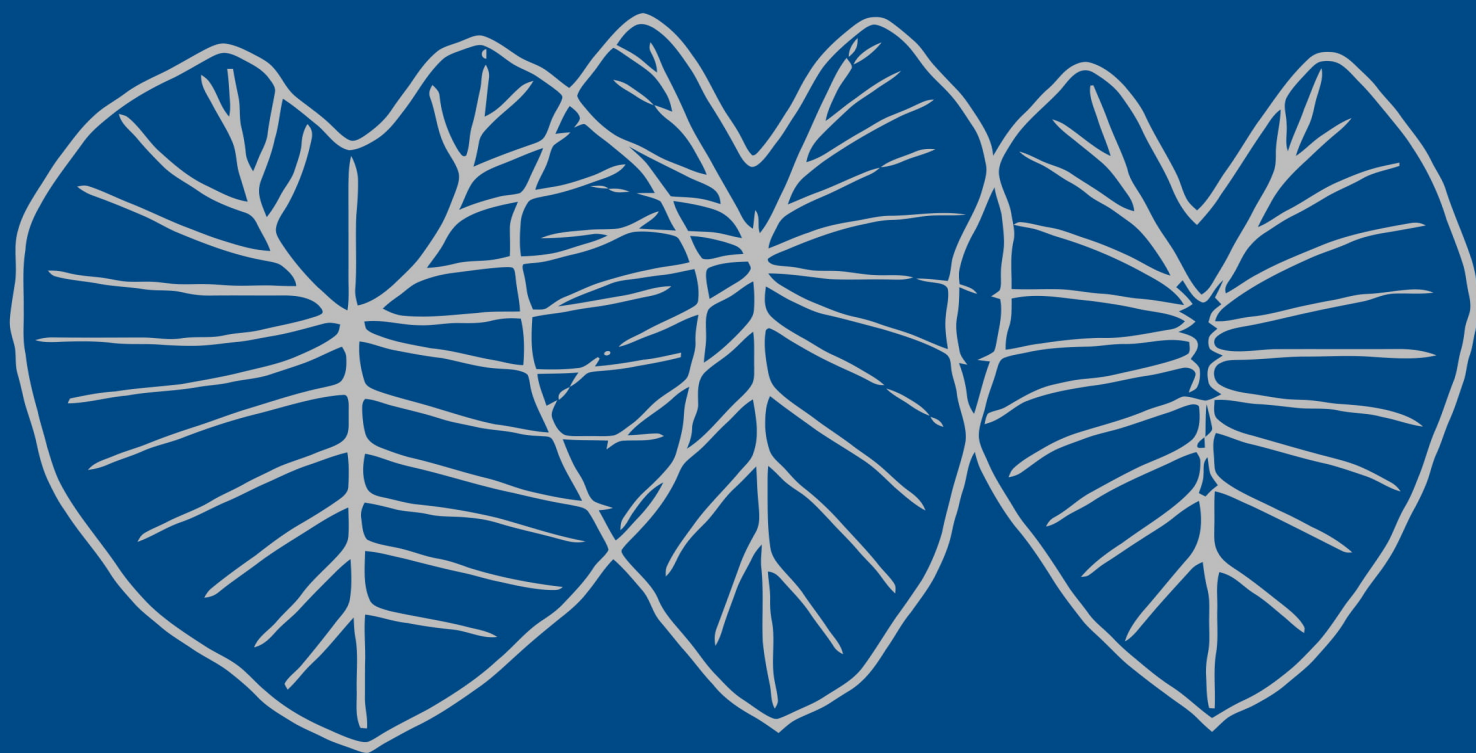
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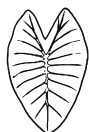
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