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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE TRADEMARK TRIAL AND APPEAL BOARD

Proceeding	91192781
Party	Defendant Biogen Idec MA Inc.
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
TRADEMARK TRIAL AND APPEAL BOARD

Opposer: Bayer HealthCare LLC
Applicant: Biogen Idec MA Inc.
Serial No.: 77/701134
Filing Date: March 27, 2009
Mark: LIXALEV
Published: July 28, 2009

Bayer HealthCare LLC)	Opposition No. 91192781
)	
Opposer,)	Application Serial No. 77/701134
)	Mark: LIXALEV
)	
v.)	
)	
Biogen Idec MA Inc.,)	
)	
Applicant)	

**APPLICANT'S REPLY BRIEF IN SUPPORT OF ITS
MOTION FOR SUMMARY JUDGMENT**

On October 15, 2010, Applicant Biogen Idec MA Inc. ("Applicant" or "Biogen") filed a Motion for Summary Judgment ("Motion") seeking summary judgment in its favor. Opposer Bayer HealthCare LLC ("Opposer" or "Bayer") subsequently filed its Opposition to Applicant's Motion for Summary Judgment ("Response") on November 19, 2010.

Applicant responds by filing this Reply Brief in Support of Applicant's Motion for Summary Judgment. Opposer has failed to submit evidence to rebut Applicant's Motion, which establishes that there is no genuine issue for trial, and that, as a matter of law and fact, there is no likelihood of confusion between Applicant's mark LIXALEV and Opposer's mark ALEVE.

ARGUMENTS

A. Summary Judgment is Appropriate on the Issue of No Likelihood of Confusion

Applicant's Motion establishes that there is no genuine issue as to the likelihood of confusion between the Applicant's mark LIXALEV and the Opposer's mark ALEVE. Applicant's Motion provides detailed arguments, supported by precedent, as to why the marks are not confusingly similar as a matter of law. Opposer's Response is essentially to argue similarity of the marks due to its "overwhelming evidence" that ALEVE is a famous mark. (Opp. Br. at 3). Opposer fails to appreciate that fame does not grant it unbridled scope to attack marks which are not close.

Applicant's LIXALEV is different in appearance, sound, and overall commercial impression from Opposer's ALEVE. Understandably, if the marks themselves are dissimilar, the first *du Pont* factor alone is determinative of the issue of confusion. *Kellogg Co. v. Pack'em Enters., Inc.*, 14 USPQ2d 1545, 1550-51 (TTAB 1990), *aff'd*, 951 F.2d 330 (Fed. Cir. 1991) (affirmed TTAB decision finding no likelihood of confusion based on appearance alone) *citing In re E.I. du Pont de Nemours & Co.*, 476 F.2d 1357, 1361 (CCPA 1973).

Opposer emphasizes the other *du Pont* factors, but these claims are red herrings to the material issue at hand. As in *Kellogg*, the resolution of these other *du Pont* factors will not alter the fact that given the vast differences in the respective marks, there is no likelihood of confusion. No further evidence that Opposer might put forth with respect to the other *du Pont* factors can change this result. Applicant has not addressed these other factors; rather they simply are not material to the present Opposition. Hence, based on the first *du Pont* factor alone, there is no likelihood of confusion as a matter of law.

B. The Fame of the Opposer's Mark is Irrelevant

Opposer argues that the "fame of the prior mark" factor is a disputed issue of material fact that is significant. In reply, for purposes of summary judgment, Applicant concedes to the fame of Opposer's ALEVE mark, but this factor still does not overcome the patent dissimilarities between the marks. Opposer appears to seek abandonment of common sense and reasonableness to have the Board find that fame allows for a distorted and highly unlikely perception of the challenged mark.

The cases which Opposer relies on for the proposition that any doubts about the likelihood of confusion must be resolved against the newcomer when the opposer's mark is famous are readily distinguishable from the present Opposition. In each of the cases on which Opposer relies, Opposer omits the actual marks from the citations which show in those matters that the prior mark and the mark for which registration was sought are far more similar in appearance, sound, and commercial impression than the marks at issue here. *Kenner Parker Toys, Inc. v. Rose Art Indus.*, 963 F.2d 350, 352-53 (Fed. Cir. 1992) (where the prior mark was PLAY-DOH for modeling compound and applicant sought to register FUNDOUGH for modeling compound); *Recot, Inc. v. Becton*, 214 F.3d 1322, 1327 (Fed. Cir. 2000) (where opposer's mark was FRITO-LAY for various snacks and applicant's mark was FIDO-LAY for treats for dogs, clearly a play on opposer's mark); *Giant Food, Inc. v. Nation's Foodservice, Inc.*, 710 F.2d 1565, 1569-70 (Fed. Cir. 1983) (where applicant sought to register GIANT HAMBURGERS, opposer brought an opposition based its prior rights in GIANT FOOD, SUPER GIANT, GIANT FOOD and design, and GIANT and design). In contrast to these cited cases, here the parties' marks are sufficiently different in appearance and sound such that the

fame of the ALEVE mark is irrelevant. Hence, Opposer's reliance on the aforementioned cases is unfounded.

C. The Marks ALEVE and LIXALEV are Sufficiently Different in Appearance, Sound, and Commercial Impression

Applicant maintains that the marks at issue are patently dissimilar in appearance, sound, and commercial impression. Opposer tacitly concedes both the substantial differences in appearance and lack of connotation similarities since its focus is heavily on the pronunciations of the subject marks.

As to appearance, differences at the beginning of a word are particularly significant because word beginnings are important in word recognition. If words have completely different initial syllables they are unlikely to be confused. (Flemming Dec. at ¶ 14).¹

Opposer's contention that the ALEV portion of Applicant's mark is dominant is spurious as it is well established that consumers are generally more inclined to focus on the first word, prefix or syllable in any trademark or service mark. *Presto Prods., Inc. v. Nice-Pak Prods., Inc.*, 9 USPQ2d 1895, 1897 (TTAB 1988) ("it is often the first part of a mark which is most likely to be impressed upon the mind of a purchaser and remembered").

While Opposer suggests that the marks *could* be pronounced similarly, given the different arrangement of the letters in the marks, Opposer's mark and Applicant's mark are significantly different in pronunciation.² The pronunciation of ALEVE is well-established and undisputed by

¹ The purpose of Edward Flemming's expert Declaration is to demonstrate the inadequacies of Bayer's attempt and failure to carry its burden to overcome summary judgment on the basic position that the subject marks are different and could not reasonably be perceived as similar.

² Bayer does not weigh the possibility of the marks actually being pronounced similarly. The question very broadly posed to its experts was the low threshold, leading question of whether LIXALEV "might be perceived" as *licks-ah-leeve*, thus ignoring the likelihood or reasonableness of such a perception. Finegan Dec. at ¶ 11. Without any weighing, the opinion is no better than George Bernard Shaw's claim that "'ghoti' could be pronounced 'fish'." *Id.* at ¶ 5.

Bayer to be ‘ah-leeve’ or [ə 'li:v]. LIXALEV, on the other hand, is an unfamiliar word, so readers have to infer its pronunciation from its spelling. (Flemming Dec. at ¶ 12).

Bayer contends that the ALEV in LIXALEV could be pronounced with a long ‘e’ but provides no reasonable support for its contention other than claiming such a pronunciation is a mere possibility – even though such a likelihood is remote which is not sufficient to rebut the differences in the marks. In fact, its own expert states that pronunciation of LIXALEV is “ambiguous,” but does not provide any relevant examples to the marks at issue. (Finegan Dec. at ¶ 10). The only reasonable pronunciation of LIXALEV that can be determined from the conventions of English spelling and the rules of English stress is ‘licks-ah-lev’ or ['lɪksə , lɛv]. (Flemming Dec. at ¶ 12).

The pronunciations of LIXALEV and ALEVE are quite distinct and differ on a number of salient features. Specifically, ALEVE has stress on the final syllable, whereas LIXALEV has stress on the initial syllable. Additionally, the final vowels are very different in the two words. (Flemming Dec. at ¶ 14).

There is also an attempt through Bayer’s other expert to dissect the marks into “morphemes” for purposes of finding similarity under the Tversky analysis. (Joachimsthaler Dec. at ¶¶ 30-31). This analysis is contrary to even the dictionary definition of a morpheme - the smallest meaningful unit in the grammar of a language. Splitting a term into morphemes is only permitted when each of the split components stands alone as a recognized term on its own. LIXALEV cannot be split into LIX and ALEV. While the parties do not agree whether ALEV is a recognized term, Bayer minimally agrees that LIX is certainly not recognized. (Joachimsthaler Dec. at ¶ 30).

ALEVE cannot be split at all, yet Bayer's expert proceeds to carve out ALEV from the Bayer mark to force his finding of similarity. Again, even if we were to accept ALEV as a morpheme, the expert fails to account for the lopped off E which is not a stand alone term. (Flemming Dec. at ¶¶ 17-18). This Tversky analysis as proposed by Bayer is improperly applied at its most basic level. (Flemming Dec. at ¶¶ 19-22). Here too, Bayer has failed to meet its burden to provide any meaningful analysis supporting similarity of the marks.

D. Opposer has Failed to Meet its Burden

The party opposing summary judgment has the burden of showing sufficient evidence of a genuine issue of material fact in dispute. *Celotex Corp. v. Catrett*, 477 U.S. 317, 324 (1986). Although Opposer claims that genuine issues of material fact exist as to confusion among the marks, Opposer does not put forth any evidence supporting reasonable overlap of the marks to satisfy the first *du Pont* factor.

CONCLUSION

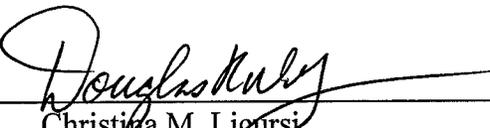
As Applicant noted in its Motion for Summary Judgment, the marks LIXALEV and ALEVE do not look alike, sound alike, or connote alike. The only similarity between the marks is that they share an inconsequential sequence of four letters, but any similarity is offset by the difference in the beginnings of the marks and in the pronunciations of the marks. Despite sharing these letters, the marks are completely different in appearance, sound, meaning and commercial impression.

Opposer has failed to provide any evidence or cite any cases which support its strained arguments for confusing similarity, and its expert opinions are only conjecture focused on remote possibilities that should not be entitled to consideration.

Applicant therefore respectfully requests that its Motion for Summary Judgment be granted, and that the Notice of Opposition be dismissed.

Respectfully submitted,

Biogen IDEC MA Inc.

By: 

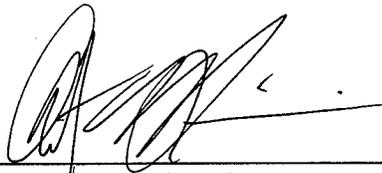
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Date: December 6, 2010
Docket No.: C1346.50000US00

CERTIFICATE OF SERVICE

I hereby certify that on December 6, 2010, I served a copy of Applicant's Reply Brief in Support of its Motion for Summary Judgment upon counsel for Opposer, by first-class mail, postage-prepaid, addressed to:

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**EDWARD FLEMMING'S DECLARATION IN SUPPORT OF BIOGEN IDEC MA
INC.'S REPLY BRIEF IN SUPPORT OF ITS
MOTION FOR SUMMARY JUDGMENT**

I, EDWARD FLEMMING, declare as follows:

1. I have been retained as an expert by Wolf, Greenfield & Sacks, P.C. in the matter of Bayer Healthcare LLC v. Biogen Idec MA Inc.
2. I have personal knowledge of the facts set forth herein, which are known to me to be correct and true, and if called as an expert I could and would competently testify thereto.
3. This declaration is submitted in support of Biogen Idec MA, Inc.'s ("Biogen") Reply Brief in Support of its Motion for Summary Judgment.

A. Background and Qualifications as an Expert

4. I have been a Linguistics scholar for more than twenty years, specializing in phonetics and phonology. I hold Masters in Linguistics from both the University of Edinburgh and the University of California, Los Angeles. In 1995, I received my Ph.D. in Linguistics from the University of California, Los Angeles. I have held faculty positions at Stanford University and at Massachusetts Institute of Technology. I have been a Professor of Linguistics at MIT since 2004, and as of 2009, I am an Associate Professor in the Department of Linguistics & Philosophy at MIT.

5. I have spoken and written extensively on perceptual similarity between words, and its importance in phonology, including:

- (2008) Asymmetries between assimilation and epenthesis. Annual Meeting of the Linguistic Society of America, Chicago.
- (2007) Stop place contrasts before liquids. Proceedings of the 16th International Congress of Phonetic Sciences, 233-236.
- (2005) Speech perception and phonological contrast. David Pisoni and Robert Remez (eds.) *The Handbook of Speech Perception*. Blackwell, Oxford, 156-181.
- (2004) Contrast and perceptual distinctiveness. Bruce Hayes, Robert Kirchner and Donca Steriade (eds.) *Phonetically-Based Phonology*. Cambridge University Press, Cambridge, 232-276.
- (2002) *Auditory Representations in Phonology*. Routledge, New York.

6. I have received numerous grants and awards, including being named Co-Principal Investigator (with David Beaver, Bob Ladd, and Mark Steedman) for Sounds of Discourse, an Edinburgh University-Stanford University Link project and being named Principal Investigator for An Optimizational Model of Phonetic Realization, a Stanford Office of Technology Licensing Research Incentive Award.

7. I regularly serve as a reviewer of articles or manuscripts for the following journals and publishers: *Anthropological Linguistics*, *Cognitive Science*, *Computational Linguistics*,

Journal of Experimental Psychology: Human Perception and Performance, Journal of Linguistics, Journal of Phonetics, Journal of the International Phonetic Association, Journal of Slavic Linguistics, Language, Language and Speech, Natural Language and Linguistic Theory, Phonology, Cambridge University Press, CSLI Publications, MIT Press, Mouton de Gruyter, Oxford University Press.

8. A true and correct copy of my curriculum vitae is attached as Exhibit A.

B. Summary of Issues and Opinion

9. I was retained by Biogen and asked to provide an opinion on the following issues:

- a. Assess whether, based on the appearance and sound of the marks, there is a similarity between LIXALEV and ALEVE?
- b. Assess the expert evidence proffered by Bayer in support of its Opposition to Biogen's Motion for Summary Judgment.

10. When initially contacted by counsel for Biogen, they only explained that they were a law firm representing a company in a trademark dispute. They had told me that the parties were generally in the pharmaceutical field and that I could assume that the goods were the same, although it was not relevant to my analysis. They did not identify the parties in any manner. I did not know whether they represented the Applicant or the Opposer. They spelled out the letters in each of the two marks and did not offer a pronunciation of either mark. They asked me to study the two marks, and asked that I provide an assessment of the similarity of appearance and sound between the two marks. No other information was provided. They also asked that I not search for any dispute involving these marks, and I did not.

11. I considered and analyzed the two marks in detail and provided an assessment that no reasonable similarity between LIXALEV and ALEVE exists. A basic test of the similarity of

two words is whether they are likely to be confused with each other.¹ Based on this standard, the marks LIXALEV and ALEVE are not similar because they are not likely to be confused with each other. This conclusion is based on consideration of both the spelling of the marks and their pronunciations.

C. **Detailed Analysis**

1. **Pronunciation of the Marks**

12. The pronunciation of ALEVE is established: [əˈlɪv].² LIXALEV, on the other hand, is an unfamiliar word, so readers have to infer its pronunciation from its spelling. The expected pronunciation that can be determined from the conventions of English spelling and the rules of English stress is [ˈlɪksəˌlɛv]. LIXALEV is pronounced with initial stress because this is the normal pattern in nouns with three syllables where the second syllable is open (does not end in a consonant) and contains a short vowel, as in the words *alphabet*, *politics*, *litigant*.³

13. The final ‘-EV’ sequence in LIXALEV does not generally occur in English words, but in the truncation *maglev* (from ‘magnetic levitation’), it is pronounced with a short ‘e’ ([ɛ]), as in words like *bed* and *left*. This letter sequence is always pronounced in this way in English pronunciations of foreign names such as *Lev*. This pattern of pronunciation is expected because *e* followed by a word-final consonant is always pronounced as short *e*, as in *alphabet*,

¹ I understand that “confusion” can have legal significance, but my use of the term is less formal and addresses the similarities of the two marks in appearance and sound.

² Phonetic transcription (or phonetic notation) is the visual representation of speech sounds (or phones). The mode of phonetic transcription used throughout this Declaration is the most common type of phonetic transcription, which uses a phonetic alphabet, the International Phonetic Alphabet (“IPA”); it was devised by the International Phonetic Association as a standardized representation of the sounds of spoken language. A copy of the IPA is attached as Exhibit B.

³ Hayes, Bruce (1982). Extrametricality and English stress. *Linguistic Inquiry* 13, 227-276.

bed, *men*, or as a reduced vowel. Accordingly, this same pronunciation is expected for the final vowel of LIXALEV.

14. The pronunciations of LIXALEV and ALEVE are quite distinct: they differ on a number of salient features, and share relatively few commonalities. Specifically, ALEVE has stress on the final syllable, whereas LIXALEV has stress on the initial syllable. Additionally, the final vowels are very different in the two words. For example, there is a long [i] (as in *bead*) in ALEVE, but a short [ɛ] (as in *bed*) in LIXALEV. Finally, LIXALEV has a whole extra syllable at the beginning that has no counterpart in ALEVE. Differences at the beginning of a word are particularly significant because word beginnings are important in word recognition, so if words differ in their initial syllables they are unlikely to be confused.⁴ The shared features of pronunciation are limited to the sequence [əl] and a consonant [v].

2. Appearance of the Marks

15. Word beginnings are also important to the confusability of printed words. For example, a study of confusions between drug names found that 74.2% involved names with identical initial letters.⁵ So the mismatches between the initial letters of the two marks make them distinct. The main similarity between the two marks is a shared substring, -ALEV-, but this is offset by the large differences in the onsets of the words, and in the pronunciations of

⁴ Marslen-Wilson, William, & Pienie Zwitserlood (1989) Accessing spoken words: The importance of word onsets. *Journal of Experimental Psychology: Human Perception and Performance* 15, 576-585.

⁵ Kondrak, Grzegorz, & Bonnie Dorr (2006). Identification of Confusable Drug Names: A New Approach and Evaluation Methodology. *Journal of AI in Medicine* 36:1, 29-42.

these substrings [ə'liv] vs. [ə,lɛv]. Similarity of printed forms is affected by similarity in pronunciation because we automatically access sound representations of words during reading.⁶

D. Bayer's Experts Assertions

a. Professor Finegan

16. As to the pronunciation of the terms, Professor Finegan contends that LIXALEV could equally be pronounced with an [i] vowel in its final syllable as in *leave*, but this conclusion is based on fallacious reasoning. (Finegan Dec. at ¶¶ 7-10). Professor Finegan's argument is based on the fact that word-medial *ev* sequences can be pronounced with a long [i] vowel as in *leave*, e.g. *lever*. However this evidence is irrelevant.

17. By Professor Finegan's reasoning, the fact that the letter sequence *et* can be pronounced with an [i] vowel in words like *meter*, *meteor*, *competing*, should lead one to expect this pronunciation to be possible for word-final *et* – that is, it should be possible to find a word spelled like *bet* that is pronounced with the vowel of *beat*. This, however, is not the case: a single *e* followed by *t* at the end of a word can *only* be pronounced as short [ɛ], as in *bet*, *wet*, *met*, etc, or as a reduced vowel [ə], as in *facet*, *violet*. Similarly, the letter sequence *en* can be pronounced with the vowel [i] in words like *senior*, *menial*, *genius*, but when *en* appears as the end of a word, it cannot be pronounced with the vowel [i]. For example, words like *men*, *when*, *ten* are always pronounced with a short [ɛ]. Therefore, Professor Finegan's contentions are erroneous, because we cannot use evidence from the pronunciation of a letter sequence in non-final position to draw conclusions about the pronunciation of that letter sequence in word-final position.

⁶ Luo, Chun R., Reed A. Johnson, & David A. Gallo (1998). Automatic activation of phonological information in reading: Evidence from the semantic relatedness decision task. *Memory & Cognition* 26, 833-843.

18. In summary, the relevant generalization in all of these cases is that a single *e* followed a word-final consonant is always pronounced as short [ɛ] or as a reduced vowel, as observed above. A long [i] vowel in the final syllable of a word must be spelled with a vowel sequence like *ee*, as in *need*, or *ea*, as in *neat*, or with a ‘silent *e*’ at the end of the word, as in *concede*, *eve*. These are very robust generalizations about the spelling and pronunciation of English words and I am not aware of any exceptions in the native vocabulary. These consistent rules of English spelling-to-sound correspondences lead to the expectation that LIXALEV should be pronounced with a short [ɛ] vowel in the final syllable, and that it is unlikely to be pronounced with a long [i].

b. Dr. Joachimsthaler

19. Dr. Joachimsthaler argues that one can conclude based on Tversky’s contrast model of similarity that “there is and will be a high degree of similarity in the names ALEVE and LIXALEV.” (Opposer’s Br. 31; Joachimsthaler Dec. at ¶¶ 25-29). According to Tversky’s contrast model, the similarity determination between two words is a function of their shared features and the features on which they differ. This, however, is a very general model of similarity, so while it may well be applicable to similarity between words, one cannot draw any conclusions from it without establishing what the relevant features of words are and their relative importance.

20. The only relevant features Dr. Joachimsthaler mentions are the morphemes⁷ that make up the words. (Joachimsthaler Dec. at ¶ 30). He further asserts that the likely pronunciation of LIXALEV is similar to ALEVE, but provides no basis for this assertion. (Joachimsthaler Dec. at ¶ 35). For example, Dr. Joachimsthaler does not substantiate his

⁷ Morphemes are defined as “the smallest component of word, or other linguistic unit, that has semantic meaning.” See <http://en.wikipedia.org/wiki/Morpheme> (last accessed December 6, 2010), attached as Exhibit C.

assertions with an analysis of the sound features that provide the basis for a measure of similarity. In fact, he does not even indicate how the two words are likely to be pronounced. When these crucial points are examined, we find, contrary to Dr. Joachimsthaler's assertions, that the marks ALEVE and LIXALEV share relatively few features, and differ on a number of more significant features that play a strong role in determining similarity between words.

21. Turning to morphological features, Dr. Joachimsthaler claims that ALEVE and LIXALEV are similar in that they share the morpheme "ALEV." (Joachimsthaler Dec. at ¶ 31). However, it is unlikely that people would break down the words in this way. Morphemes are the smallest meaningful subparts of words, with consistent meaning and consistent pronunciation. For example, a word like 'breakable' consists of two morphemes 'break' and '-able', both of which contribute meaning to the word and both of which occur in other words (e.g. 'break' can occur as an independent word, '-able' appears in words such as 'readable', 'likeable' etc.)

22. Here, the first problem with identifying 'ALEV' as a morpheme in these two words is that neither its spelling nor its pronunciation is consistent across the two words. In spelling, ALEVE has a final E that is absent in LIXALEV. The final E in ALEVE cannot be analyzed as a separate morpheme because it does not bear any independent meaning.

23. In pronunciation, the relevant portions of the two words are [ə'liv] in ALEVE as opposed to [ə,lev] in LIXALEV. The pronunciation of morphemes can vary across contexts, but only as a result of systematic rules of pronunciation. Because the relevant sequences occur in similar contexts (at the end of a word), there is no rule of English pronunciation which could account for such a difference in the pronunciation of a morpheme. Finally, breaking down LIXALEV in this way implies that the initial LIX- is also a morpheme, but no such morpheme

occurs in English words, so the decomposition that Dr. Joachimsthaler is suggesting is not viable.

Conclusion

24. In conclusion, the words LIXALEV and ALEVE differ on a variety of significant features of pronunciation, and share very few features of pronunciation or morphology. In my opinion, based on a model of similarity such as Tversky's contrast model, we can conclude that LIXALEV and ALEVE are dissimilar.

I declare under the penalty of perjury that the foregoing is true and correct. Executed this 6th day of December in Cambridge, Massachusetts.

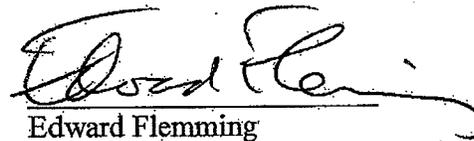

Edward Flemming

EXHIBIT A

Edward Flemming

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Education and Experience

- 2009 – present Associate Professor, Dept of Linguistics & Philosophy, MIT.
- 2007 – 2009 Associate Professor (without tenure), Dept of Linguistics & Philosophy, MIT.
- 2004 – 2007 Visiting Assistant Professor, Dept of Linguistics & Philosophy, MIT.
- 1996 – 2004 Assistant Professor, Dept of Linguistics, Stanford University.
- 1995 – 1996 Acting Assistant Professor, Dept of Linguistics, Stanford University.
- 1995 Post-doctoral Associate, Dept of Linguistics and Philosophy, MIT.
- 1995 Ph.D. in Linguistics, University of California, Los Angeles. Dissertation title: *Auditory Representations in Phonology* (supervisor: Donca Steriade).
- 1991 – 1994 Teaching Assistant, Department of Linguistics, University of California, Los Angeles.
- 1992 M.A. in Linguistics, University of California, Los Angeles.
- 1990 M.A. (Hons) in Linguistics with Artificial Intelligence, University of Edinburgh, Scotland.

Grants and Awards

- 2002-2004 Co-Principal Investigator (with David Beaver, Bob Ladd, and Mark Steedman). Sounds of Discourse. Edinburgh University-Stanford University Link project, funded by Scottish Enterprise, \$140,000.
- 1998-1999 Principal investigator. An Optimizational Model of Phonetic Realization. Stanford Office of Technology Licensing Research Incentive Award, \$25,000.
- 1994-1995 Dissertation Year Fellowship, University of California, Los Angeles.
- 1990-1991 Chancellors' Fellowship, University of California, Los Angeles.

Work in Progress

- Coarticulation (to appear in the Wiley-Blackwell *Companion to Phonology*) (22 pp.)
- The Realized Input (30 pp.)
- Asymmetries between assimilation and epenthesis (under revision) (41 pp.)

A phonetically-based model of phonological vowel reduction (35pp.)

Publications

- 2010 Modeling listeners. Cécile Fougeron, Barbara Kühnert, Mariapaola D'Imperio and Nathalie Vallé (eds) *Laboratory Phonology 10*, De Gruyter Mouton, Berlin.
- 2010 Michael Wagner, Mara Breen, Edward Flemming, Stefanie Shattuck-Hufnagel & Edward Gibson. Prosodic effects of discourse salience and association with focus. *Speech Prosody 2010*.
- 2009 The phonetics of schwa vowels. Donka Minkova (ed.) *Phonological Weakness*, Palgrave Macmillan, 78-95.
- 2008 The grammar of coarticulation. 16pp. (To appear in M. Embarki and C. Dodane (eds.) *La Coarticulation: Indices, Direction et Représentation*, L'Harmattan, Paris).
- 2008 Edward Flemming, Peter Ladefoged and Sarah G. Thomason. The Phonetic Structures of Montana Salish. *Journal of Phonetics* 36:3, 465-491.
- 2007 Stop place contrasts before liquids. Proceedings of the 16th International Congress of Phonetic Sciences, 233-236.
- 2007 David I. Beaver, Brady Z. Clark, Edward Flemming, T. Florian Jaeger and Maria K. Wolters. When semantics meets phonetics: Acoustical studies of second occurrence focus. *Language* 83.2, 251-282.
- 2007 Edward Flemming and Stephanie Johnson. Rosa's roses: reduced vowels in American English. *Journal of the International Phonetic Association* 37, 83-96.
- 2005 Speech perception and phonological contrast. David Pisoni and Robert Remez (eds.) *The Handbook of Speech Perception*. Blackwell, Oxford, 156-181.
- 2004 Deriving natural classes in phonology. *Lingua* 115, 287-309.
- 2004 Contrast and perceptual distinctiveness. Bruce Hayes, Robert Kirchner and Donca Steriade (eds.) *Phonetically-Based Phonology*. Cambridge University Press, Cambridge, 232-276.
- 2004 Keith Johnson, Edward Flemming and Richard Wright. Response to Whalen et al. *Language* 80, 646-648.
- 2003 The relationship between coronal place and vowel backness. *Phonology* 20, 335-373.
- 2002 *Auditory Representations in Phonology*. Routledge, New York.
- 2001 Review of Michael B. Broe and Janet B. Pierrehumbert, *Papers in Laboratory Phonology V: Acquisition and the Lexicon*. *Phonology* 18. 439-444.
- 2001 Scalar and categorical phenomena in a unified model of phonetics and phonology. *Phonology* 18. 7-44.
- 1997 Phonetic detail in phonology: Towards a unified account of assimilation and coarticulation. Keiichiro Suzuki and Dirk Elzinga (eds.) *Proceedings of the 1995 Southwest Workshop in Optimality Theory (SWOT)*. University of Arizona. 39-50.
- 1997 Phonetic optimization: Compromise in speech production. *University of Maryland*

Working Papers in Linguistics 5: Selected phonology papers from H-OT-97. 72-91.

- 1996 Evidence for constraints on contrast: The dispersion theory of contrast. *UCLA Working Papers in Phonology* 1. 86-106.
- 1996 Laryngeal metathesis and vowel deletion in Cherokee. *Cherokee Papers from UCLA, UCLA Occasional Papers in Linguistics* 16. 23-44.
- 1995 Dani Byrd, Edward Flemming, Carl A. Mueller and Cheng Cheng Tan. Using regions and indices in EPG data reduction. *Journal of Speech and Hearing Research* 38. 821-827.
- 1994 The role of metrical structure in segmental rules. *Proceedings of the North East Linguistic Society 24, vol. 1*. GLSA, University of Massachusetts, Amherst. 97-110.
- 1994 Patricia A. Keating, Dani Byrd, Edward Flemming and Yuichi Todaka. Phonetic analyses of word and segment variation using the TIMIT corpus of American English. *Speech Communication* 14. 131-142.
- 1993 Keith Johnson, Edward Flemming and Richard Wright. The hyperspace effect: Phonetic targets are hyperarticulated. *Language* 69. 505-528.

Invited Lectures

- 2009 The grammar of coarticulation. Department of Linguistics, Yale.
- 2009 The role of grammar in imitation and adaptation. Commentary presented at the workshop on 'the Culture-Phonology Interface: Implications of Laboratory Sociophonetics for Phonological Theory', Annual Meeting of the Linguistic Society of America, San Francisco.
- 2008 The role of pitch range in focus-marking. *Forms and Functions of Prosodic Structure*. Studiecentrum Soeterbeeck, Ravenstein, The Netherlands.
- 2007 The grammar of coarticulation. *La coarticulation: indices, direction et representation*. CNRS-Montpellier III, France.
- 2007 The role of distinctiveness constraints in phonology. Department of Linguistics, State University of New York, Stony Brook.
- 2007 Stop place contrasts before liquids. Special session 'Is there a biological grounding of phonology?', 16th International Congress of Phonetic Sciences, Saarbrücken.
- 2006 Invited commentator, 'Variation, phonetic detail and phonological modeling', Tenth Conference on Laboratory Phonology, Paris.
- 2006 Contrast and the realization of schwa vowels in English. Scuola Normale Superiore, Pisa.
- 2006 The role of distinctiveness constraints in phonology. Department of Linguistics, University of Massachusetts, Amherst.
- 2005 Contrast and the realization of schwa vowels in English. Speech Communication Group Seminar, MIT.
- 2004 The phonetics and phonology of tongue body position in coronal consonants. Department of Linguistics, University of Michigan.

- 2003 The phonetics and phonology of tongue body position in coronal consonants. Department of Linguistics and Philosophy, MIT.
- 2003 Deriving natural classes in Phonology. Department of English, Seoul National University.
- 2003 A model of phonetic and phonological vowel reduction. 2nd Korean International Conference on Phonology, Seoul.
- 2002 A model of phonetic and phonological vowel reduction. Department of Linguistics, University of California, Los Angeles.
- 2001 Vowel reduction and duration-dependent undershoot. Conference on the Phonetics-Phonology Interface, Zentrum für Allgemeine Sprachwissenschaft, Berlin.
- 1999 Hyperarticulation and contrast. Workshop on Contrastiveness in Synchronic and Diachronic Phonology, University of California, Berkeley.
- 1999 How to formalize constraints on the distinctiveness of contrasts. International Congress of the Phonetic Sciences Satellite meeting on the Role of Perception in Phonology, San Francisco.
- 1999 Scalar parameters in phonology. GLOW Workshop on Phonetics in Phonology, Potsdam, Germany.
- 1998 Natural classes in phonology. Department of Linguistics, University of California, Berkeley.
- 1998 Phonetics, phonology, or phonetics-phonology?. Commentary, 6th Conference on Laboratory Phonology, York University, UK.
- 1997 Some arguments against underlying representations in phonology. Department of Linguistics, University of California, Irvine.
- 1997 Optimization without strict constraint dominance. Southwest Workshop on Optimality Theory 3, University of California, Los Angeles.
- 1997 Phonetic optimization: Compromise in speech production. Hopkins Optimality Theory Workshop, Johns Hopkins University, Baltimore.
- 1996 Phonetic realization as an optimization problem: The case of formant transitions. CSLI Workshop on Optimality Theory and its implications for cognitive theory, Stanford.
- 1996 Evidence for constraints on phonological contrasts. University of California, Berkeley; University of California, Davis; and University of California, Santa Cruz.

Other Presentations

- 2009 Breen, Mara, Michael Wagner, Stefanie Shattuck-Hufnagel, Edward Flemming, and Edward Gibson. Factoring out speaker variation in experimental studies of prosody: the case of association with focus. Workshop on Prosody and Meaning, Barcelona.
- 2008 Asymmetries between assimilation and epenthesis. Annual Meeting of the Linguistic Society of America, Chicago.
- 2006 Flemming, Edward and Patrick Jones. Cues to stop place in stop-liquid clusters. Poster

- presented at the 152nd Meeting of the Acoustical Society of America, Honolulu.
- 2005 Targetless schwa revisited. Poster presented at the 149th Meeting of the Acoustical Society of America, Vancouver.
- 2004 Flemming, Edward, and Stephanie Johnson. Rosa's roses: Reduced vowels in American English. Poster presented at the 147th Meeting of the Acoustical Society of America, New York.
- 2004 Beaver, Clark, Flemming and Jaeger. The perception of second occurrence focus. Annual Meeting of the Linguistic Society of America, Boston.
- 2003 Beaver, Clark, Flemming and Wolters. Debunking the argument from second occurrence focus. Annual Meeting of the Linguistic Society of America, Atlanta.
- 2001 Coronal-dorsal interactions. Western Conference on Linguistics 2001, Seattle.
- 1995 Evidence for constraints on contrasts. 14th West Coast Conference on Formal Linguistics, University of Southern California, Los Angeles.
- 1994 Perceptual features in phonology: Evidence from consonant-vowel assimilation. 25th Annual Meeting of the North East Linguistic Society, University of Pennsylvania, Philadelphia.
- 1994 Phonetic structures of an endangered language: Montana Salish. 127th Meeting of the Acoustical Society of America, Massachusetts Institute of Technology, Cambridge.
- 1993 The role of metrical structure in segmental rules. 24th Annual Meeting of the North East Linguistic Society, University of Massachusetts, Amherst.
- 1992 Ian Maddieson and Edward Flemming. Cross-linguistic preferences in onset-nucleus sequences. 124th Meeting of the Acoustical Society of America, New Orleans.

Courses Taught

Accents of English (Freshman Seminar)

Experimental Phonology

Introduction to Phonetics and Phonology

Laboratory Phonology

Linguistic Phonetics

Phonology I (Graduate introduction)

Phonology II (Graduate)

Phonetic Field Methods

Seminars:

Constituent Structure in Phonology

Experimental Phonetics

Functional Explanation in Phonetics and Phonology

Intonation and Meaning

Intonation

Natural Classes

Phonetic Explanation in Phonology

Sound change and phonological theory (with Albright, Kenstowicz and Steriade).

Phonetic Realization.

Doctoral Supervision

Hyesun Cho. 2010. *A Weighted Constraint Model of F₀ Movements*. Senior researcher, Spoken Language Processing Lab, Center for Humanities and Information, Seoul National University.

Jonah Katz. 2010. *Compression Effects, Perceptual Asymmetries, and the Grammar of Timing*. Post-doctoral research fellow, CNRS, Institut Jean Nicod.

Eunjin Oh. 2000. *Non-Native Acquisition of Coarticulation: The Case of Consonant-Vowel Syllables*. Assistant Professor in Linguistics, Department of English Language and Literature, Ewha Womans University, Korea.

Hee-Sun Kim. 2004. *The Integration of Multi-level Information in Auditory Sentence Processing*. Coordinator and Lecturer, Korean Language Program, Stanford University.

Professional Societies

The Linguistic Society of America
The Acoustical Society of America
The International Phonetics Association

Professional Service

Reviewer of articles or manuscripts: *Anthropological Linguistics, Cognitive Science, Computational Linguistics, Journal of Experimental Psychology: Human Perception and Performance, Journal of Linguistics, Journal of Phonetics, Journal of the International Phonetic Association, Journal of Slavic Linguistics, Language, Language and Speech, Natural Language and Linguistic Theory, Phonology*, Cambridge University Press, CSLI Publications, MIT Press, Mouton de Gruyter, Oxford University Press.

Reviewer of grants: National Science Foundation, Netherlands Organization for Scientific Research.

International Advisory Board, Poznan Linguistics Meeting, 2007-present.

Organizing Committee, International Congress of Phonetic Sciences '99, 1998-1999.

Advisory Committee, Applied Speech Technology Lab, CSLI, Stanford, 1995-1997.

Visiting Faculty, 2005 Linguistic Society of America Linguistic Institute, Harvard University and Massachusetts Institute of Technology.

EXHIBIT B

THE INTERNATIONAL PHONETIC ALPHABET (revised to 1993)

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			ʀ					ʀ		
Tap or Flap				ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
⦿ Bilabial	ɓ Bilabial	ʼ as in:
ǀ Dental	ɗ Dental/alveolar	p' Bilabial
ǃ (Post)alveolar	ɟ Palatal	t' Dental/alveolar
ǂ Palatoalveolar	ɡ Velar	k' Velar
ǁ Alveolar lateral	ɠ Uvular	s' Alveolar fricative

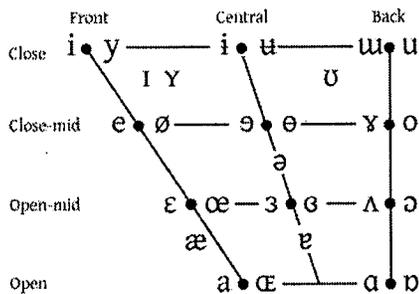
SUPRASEGMENTALS

- ˈ Primary stress *foonaˈtɪʃən*
- ˌ Secondary stress
- ː Long *eː*
- ˑ Half-long *eˑ*
- ◌̥ Extra-short *ɛ̥*
- ◌̚ Syllable break *ji.ækt*
- ◌̚ˑ Minor (foot) group
- ◌̚ˑˑ Major (intonation) group
- ◌̚ˑˑˑ Linking (absence of a break)

TONES & WORD ACCENTS

LEVEL	CONTOUR
◌̥ or ˥ Extra high	˥ Rising
˥ High	˨ Falling
˧ Mid	˨˨ High rising
˩ Low	˩ Low rising
◌̥˩ Extra low	˩˥ Rising-falling etc.
↓ Downstep	↗ Global rise
↑ Upstep	↘ Global fall

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel

DIACRITICS Diacritics may be placed above a symbol with a descender, e.g. ŋ̥

◌̥ Voiceless <i>ŋ̥ ɖ̥</i>	◌̤ Breathy voiced <i>b̤ a̤</i>	◌̚ Dental <i>t̚ d̚</i>
◌̤ Voiced <i>s̤ ʈ̤</i>	◌̚ˑ Crenky voiced <i>b̚ˑ a̚ˑ</i>	◌̚ˑ Apical <i>t̚ˑ d̚ˑ</i>
◌̚ Aspirated <i>tʰ dʰ</i>	◌̚ˑˑ Linguolabial <i>t̚ˑˑ d̚ˑˑ</i>	◌̚ˑˑ Laminar <i>t̚ˑˑ d̚ˑˑ</i>
◌̚ˑ More rounded <i>ɔ̚ˑ</i>	◌̚ˑˑˑ Labialized <i>t̚ˑˑˑ d̚ˑˑˑ</i>	◌̚ˑˑˑ Nasalized <i>ẽ̚ˑˑˑ</i>
◌̚ˑˑ Less rounded <i>ɔ̚ˑˑ</i>	◌̚ˑˑˑˑ Palatalized <i>t̚ˑˑˑˑ d̚ˑˑˑˑ</i>	◌̚ˑˑˑˑ Nasal release <i>d̚ˑˑˑˑˑ</i>
◌̚ˑˑˑ Advanced <i>u̚ˑˑˑ</i>	◌̚ˑˑˑˑˑ Velarized <i>t̚ˑˑˑˑˑ d̚ˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑ Lateral release <i>d̚ˑˑˑˑˑˑ</i>
◌̚ˑˑˑˑ Retracted <i>i̚ˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑ Pharyngealized <i>t̚ˑˑˑˑˑˑ d̚ˑˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑ No audible release <i>d̚ˑˑˑˑˑˑˑ</i>
◌̚ˑˑˑˑˑ Centralized <i>ẽ̚ˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑˑ Velarized or pharyngealized <i>t̚ˑˑˑˑˑˑˑ</i>	
◌̚ˑˑˑˑˑˑ Mid-centralized <i>ẽ̚ˑˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑˑˑ Raised <i>ɛ̚ˑˑˑˑˑˑˑ</i> (<i>ɟ̚ˑˑˑˑˑˑˑ</i> = voiced alveolar fricative)	
◌̚ˑˑˑˑˑˑˑ Syllabic <i>ɟ̚ˑˑˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑˑˑˑ Lowered <i>ɛ̚ˑˑˑˑˑˑˑˑ</i> (<i>β̚ˑˑˑˑˑˑˑˑ</i> = voiced bilabial approximant)	
◌̚ˑˑˑˑˑˑˑˑ Non-syllabic <i>ɛ̚ˑˑˑˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑˑˑˑˑ Advanced Tongue Root <i>ɛ̚ˑˑˑˑˑˑˑˑˑ</i>	
◌̚ˑˑˑˑˑˑˑˑˑ Rhoticity <i>ɛ̚ˑˑˑˑˑˑˑˑˑˑ</i>	◌̚ˑˑˑˑˑˑˑˑˑˑˑ Retracted Tongue Root <i>ɛ̚ˑˑˑˑˑˑˑˑˑˑ</i>	

OTHER SYMBOLS

- ɱ Voiceless labial-velar fricative
- ɮ Alveolo-palatal fricatives
- ɺ Voiced labial-velar approximant
- ɻ Alveolar lateral flap
- ɥ Voiced labial-palatal approximant
- ɧ Simultaneous *ʃ* and *X*
- ħ Voiceless epiglottal fricative
- ʕ Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary
- ʡ Voiced epiglottal fricative
- ʢ Epiglottal plosive

k̟p̟ t̟s̟

EXHIBIT C

Morpheme

From Wikipedia, the free encyclopedia

In linguistics, a **morpheme** is the smallest component of word, or other linguistic unit, that has semantic meaning. The term is used as part of the branch of linguistics known as morpheme-based morphology. A morpheme is composed by phoneme(s) (the smallest linguistically distinctive units of sound) in spoken language, and by grapheme(s) (the smallest units of written language) in written language.

The concept of *word* and *morpheme* are different, a morpheme may or may not stand alone. One or several morphemes compose a word. A morpheme is *free* if it can stand alone (ex: *one*, "possible", or *bound* if it is used exclusively alongside a free morpheme (ex: *im* in *impossible*). Its actual phonetic representation is the *morph*, with the different morphs (*th*-, "im-") representing the same morpheme being grouped as its *allomorphs*.

English example:

The word "unbreakable" has three morphemes: "un-", a bound morpheme; "break", a free morpheme; and "-able", a bound morpheme. "un-" is also a prefix, "-able" is a suffix. Both "un-" and "-able" are affixes.

The morpheme plural-s has the morph "-s", /s/, in *cats* (/kæts/), but "-es", /ɪz/, in *dishes* (/dɪʃɪz/), and even the voiced "-s", /z/, in *dogs* (/dɒgz/). "-s". These are allomorphs.

Contents

- 1 Types of morphemes
 - 1.1 Other variants
- 2 Morphological analysis
- 3 See also
- 4 References
- 5 External links

Types of morphemes

- Free morphemes, like *town* and *dog*, can appear with other lexemes (as in *town hall* or *dog house*) or they can stand alone, i.e., "free".
- Bound morphemes like "un-" appear only together with other morphemes to form a lexeme. Bound morphemes in general tend to be prefixes and suffixes. Unproductive, non-affix morphemes that exist only in bound form are known as "cranberry" morphemes, from the "cran" in that very word.
- Derivational morphemes can be added to a word to create (derive) another word: the addition of "-ness" to "happy," for example, to give "happiness." They carry semantic information.
- Inflectional morphemes modify a word's tense, number, aspect, and so on, without deriving a new word or a word in a new grammatical category (as in the "dog" morpheme if written with the

plural marker morpheme "-s" becomes "dogs"). They carry grammatical information.

- Allomorphs are variants of a morpheme, e.g., the plural marker in English is sometimes realized as /-z/, /-s/ or /-ɪz/.

Other variants

- Null morpheme
- Root morpheme
- Word stem

Morphological analysis

In natural language processing for Japanese, Chinese and other languages, morphological analysis is a process of segmenting a given sentence into a row of morphemes. It is closely related to Part-of-speech tagging, but word segmentation is required for these languages because word boundaries are not indicated by blank spaces. Famous Japanese morphological analysers include Juman (<http://nlp.kuee.kyoto-u.ac.jp/nl-resource/juman-e.html>) , ChaSen and Mecab (<http://mecab.sourceforge.net/>) .

See also

Linguistics

- International Phonetic Alphabet
- Hybrid word
- Alternation (linguistics)
- Theoretical linguistics
- Marker (linguistics)
- Morphological parsing

Lexicology

- Greek morphemes
- Lexeme
- Morphophonology
- Chereme
- Grapheme
- Phoneme
- Sememe
- Floating tone

References

- Spencer, Andrew (1992). *Morphological Theory*. Oxford: Blackwell.

External links

- Glossary of Reading Terms (http://www.educationoasis.com/curriculum/Reading/glossary_reading_terms.htm)
- Comprehensive and searchable morpheme reference (<http://www.prefixsuffix.com/>)
- Linguistics 001 — Lecture 7 — Morphology (http://www.ling.upenn.edu/courses/Fall_2007/ling001/morphology.html) by Prof. Mark Lieberman
- Morphemes — A New Threat to Society (<http://specgram.com/LP/26.coma.morpheme.html>) : A humorous look at morphemes. Accurate, but purposely confuses morphemes with narcotics (i.e., "morphine").
- Morpheme Study Aid (<http://darkwing.uoregon.edu/~l150web/studyaid/>)
- Pronunciation of the word morpheme (<http://cougar.eb.com/soundc11/m/morphe01.wav>)

Retrieved from "<http://en.wikipedia.org/wiki/Morpheme>"

Categories: [Units of linguistic morphology](#) | [Greek loanwords](#)

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