Reconsidering the Canons of Sound-Change: Towards a "Big Bang" Theory

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1. Introduction

Despite 150 years of investigations into the degree of phonetic regularity in sound-change — including Labov's (1981, 1994) seemingly definitive demonstration that some phonological change is sufficiently systematic to count as "Neogrammarian sound-change" — much about such "regular sound-change" remains poorly understood. In (1) are listed several such issues that are, at present, the major unresolved questions facing all attempts to understand, not only sound-change in general, but also any given sound-change:

(1) Unresolved Issues Concerning Sound-Change(s) —

a. the range of conditioning factors typically relevant at the onset of a change;

b. whether the same conditioning holds throughout the "lifespan" of a change;

c. the types of alterations possible within this conditioning;

d. whether such alterations prevent successive instantiations from counting as the "same" change;

e. how long a change remains "active";

f. whether the point of origin of a change can (or should) be distinguished from its spread/ diffusion (cf. Labov 1966ff., Wang 1969ff., Milroy & Milroy 1985, Milroy 1992);

g. exactly where in the lifespan of a change the purely phonetic conditions recognized by the Neogrammarians hold.

More generally, sound-change has a sociolinguistic side (cf. Labov's work, cited above), a phonetic side (demonstrated most convincingly in recent years by Ohala 1974, 1989, 1993, etc.),

and also a phonological side. This phonological aspect was advocated early on by Bloomfield (1933), who stated that, in sound-change, "phonemes change" — i.e., in some sense, change is located in abstract units of grammar — but later also by Kiparsky (1965, 1988) and related work within a generative framework. Thus, the most relevant and salient question concerning sound-change is that given in (2):

(2) What are the respective roles in sound-change of phonetic, phonological, and social factors?

In this paper, we argue that a serious consideration of these crucial issues and of their possible resolution motivates what can be called a "Big Bang" theory of sound-change. A crucial distinction must be made between the inception/onset/point-of-origin of a change — what we refer to here, following Andersen (1989), Milroy (1992), and others, as an "innovation" — and the dimensions along which it spreads. We see this point of origin as necessarily involving both a highly restricted context and a temporally quite restricted domain, too (metaphorically rather like the instant of creation of the universe within the cosmological Big Bang theory — cf., e.g., Weinberg (1993) — though clearly not quite that brief). However, this brief period determines much of the future trajectory that the innovation takes as it spreads through an individual's usage and through a speech community. We posit, moreover, that the nature of the conditioning factors associated with an innovation can change during the period of spread, and that the dimensions along which this spread takes place are quite varied. The key elements in this model are sketched in (3):

(3) A "Big Bang" Theory of Sound-Change —
a. sound-change originates in a very "small", highly localized context over a relatively
     short temporal span;
b. purely phonetic conditions govern an innovation at this necessarily somewhat brief and
     limited point of origin;

c.   this brief "burst" of (an) innovation partially determines its future trajectory as it spreads through an individual's usage and through a speech community;

d. the purely phonetic conditions of (b) are rapidly supplanted during spread — stage (c) immediately above — via speakers' imposition of phonological and sociolinguistic conditions, with the result that the future course of the process is thereby deflected;

e. further reanalyses wholly or partially in terms of morphological and/or lexical conditions (= morpholexical — i.e., "grammatical" — ones) represent commonly occurring ultimate divergences from the initial unity of the closely contextualized original innovation (regarding the later stages of at least one such development, see Janda 1998 on High German umlaut).

Insisting on the obligatory early presence of fine phonetic conditioning (à la Ohala) has at least three important benefits. First, it explains *why* regularity holds (see Joseph 1999 for further discussion): purely phonetic environments guarantee that a change will be applicable whenever its most general conditions are met, since phonetic environments, almost by definition, are maximally general. Second, it explains *when* regularity necessarily holds: i.e., definitely at the outset, due to the phonetic conditioning, and thus as long as the phonetic conditions are relevant thereafter (cf. Anderson 1981); recall from (3d) the assumption that these conditions can change. It is important to note further that regularity in the result of a change may be achieved by other generalizations of conditioning environments, but also that only when phonetic conditions constitute the sole relevant environment will there of necessity be regularity.[1] Third, it follows necessarily that grammatically- or functionally-based exceptions to an innovation (a "sound-change") are absent from the inception stage, thereby providing an answer, in the negative, to the question of whether there exists "grammatically conditioned sound-change" (here cf. also especially Hock 1976): no, not at this stage of the lifespan of a sound-related innovation.

Articulating such a synthetic view of sound-change is necessary because much of the literature that purports to discuss sound-change has failed to appreciate a crucial and highly significant distinction: namely, that between an *innovation* and a *diachronic* correspondence, as emphasized by Andersen (e.g., Andersen 1989: 12-13) and others (e.g., Jeffers & Lehiste 1979: 1, who distinguish 'phonetic correspondences' from 'phonetic changes'). An *innovation* is the *dynamic* alteration that occurs at the point of origin: i.e., the transitional course of one event as it happens and is propagated forth in what is, essentially, "polysynchrony" or "micro-" or "linear diachrony". A *correspondence*, however, is the *static* relationship that exists between comparable elements in different stages of a language — the juxtaposition, therefore of two temporally distinct states, regardless of the number of events intervening between them — and thus characterizable, in essence, as "macro-" or "polar" diachrony.

Many statements of sound-change in the literature are actually instances of correspondences, and claims about possible and impossible sound-changes are often statements, not about changes, but about correspondences; as such, they are actually somewhat misguided and misleading.[2] For instance, the famous case of Proto-Indo-European [PIE] *dw turning ultimately into Armenian [erk] — see (4a) below — is really just a correspondence, compressing numerous less drastic alterations, some of which are listed here in (4a). This is also the case with other instances that are perhaps less drastic and more mundane — but no less significant in terms of what they show. See, e.g., the sample in (4b-d), where the correspondences are stated, along with some (hopefully enlightened) guesses as to the various innovations that added up to the particular correspondence (whereby the ellipses indicate there may be more steps beyond those signaled here: i.e., these steps may also in fact be correspondences, rather than simply innovations):[3]

(4) *Correspondences* (Indicated by "> … >") vs. *Innovations* (Indicated by ">") —

a. PIE *dw > … > Arm[enian] *erk*; e.g., 'two' PIE *dwó(w) > … > Arm. *erku* (presumably

      via *dw > … > dg > … > tg > tk > … > rk > … > [erk]; cf. Hock 1991: 583-4);

b. s > … > r /V__V (e.g., from early to later Latin; perhaps via s > z > z > r > r);

c. -Vns > … > -Vf (e.g., from pre-Oscan to Oscan; presumably via ns > nts > nt^h > nq >

   nf > f);

d. t > … > ∂ /V__V (e.g., from Latin to Spanish; via t > d > ∂).

To motivate this "Big Bang" model, beyond discussing the strictly conceptual bases listed above, we turn, in the remainder of this paper, to three case-studies that illustrate the model clearly and empirically: a re-examination of two well-known changes, Romance *e*-prothesis in *s*C- clusters and Swiss German *o*-lowering, and an examination of one relatively neglected contemporary change — *s*-retraction in present-day English clusters like *#str…/…r#st…*.

2. Romance Vowel-Prothesis

The basic facts about vowel prothesis in Romance, the so-called " *s impurum*" phenomenon — here illustrated with Spanish and French, though the effects were more widespread — are that Latin word-initial clusters of sC- ended up with a prothetic front/high vowel: e.g., *e* in Spanish and French, as in Latin *schola* 'school' > … > Spanish *escuela*, French *école* (etc.); Latin *sponsa* 'betrothed' > … > Spanish *esposa*, French *épouse* (etc.). The treatment given by most discussions of Romance linguistics for this development (e.g., Boyd-Bowman 1980: 125, Mendeloff 1969: 18; Posner 1996: 290) presents it as something that took place in an environment that depends always and only on word-boundaries. However, following Hock (1976), we take word-boundary to be a grammatical construct, not a phonetic or phonological one, and thus one that, in the "Big Bang" model, should not figure in sound-change as rigorously defined (what in our view is best labeled as "sound-change proper" or "sound-change in the strict sense").   For example, word-final consonants can often be resyllabified with a following vowel-initial word, but they clearly cannot be resyllabified before a pause or before a consonant-initial form; hence, there are many solid phonetic differences hiding in the notation "/__#".

Importantly, from our point of view, what is generally overlooked in most treatments of Romance prothesis — though Lausberg (1967) and Lloyd (1987) are exceptions in this regard — is that, in origin, this development was not a word-boundary phenomenon; rather, it was sensitive to sentence-level sandhi conditioning, referred to in German under the rubric of *Satzphonetik*. That is, originally the prothesis was just for initial *sC-* after a consonant — /…C#__sC… — but not after a vowel. This distribution is still preserved in (prescriptive) standard Italian, where one finds *in iscuola* 'in school', with prothesis, but *la scuola* 'the school', with no prothesis. Thus, it seems that this innovation was, at the outset, a syllable-structure-based development repairing the *per se* unsyllabifiable sequence …C # *s* C… (but not …V # *s* C…, which required no adjustment). The extension of prothesis to any word-initial *sC-* cluster, regardless of the preceding sound, must be a later (non-phonetic, non-syllable-structure-driven) generalization. This conclusion is supported (cf. Lausberg 1967) by the non-appearance of prothesis in those Romance dialects where final consonants were lost earliest and most extensively, since this bled away the initial element of the crucial …C#__sC… environment.

The view of Romance V-prothesis from the vantage point of a "Big Bang" model of sound-change is thus roughly as follows. Phonetics was relevant during the initial phase, when the innovation began — in the form of a syllable-structure-driven repair strategy — but then subsequent speakers reinterpreted the basis for the innovation and/or extended it along different parameters, giving the change a very different character as its "lifespan" unfolded. The dephoneticizing generalization from a word-initial post-consonantal context to a merely word-initial one (pure and simple) in Spanish, French, etc. — which minimized and ultimately completely eliminated the once purely syllable-structural basis for prothesis — presumably arose when prothesis was reanalyzed as being crucially dependent on word-boundaries alone, and so as at least partly grammatical in nature (in the absence of a consistent phonetic interpretation for "word-initial" position). The endpoint (for Spanish, at least) is a strong morpheme/word-structure constraint (though one open to various sorts of analyses, depending on the theoretical "ground

rules") — but, in any case, a generalization outside the realm of phonetics *per se*, and now clearly less phonetically driven in Spanish than it was originally. We note, for instance, that there are two Spanish variants for the name of former Czechoslovakia: *Checoslovaquia,* without (compound-internal) prothesis, and *Checoeslovaquia*, with prothesis; this variation is something that would be unexpected (or at least much less expected) if the process were purely phonetically driven (since the input contains an [o] available for resyllabification with the following sibilant).[4]

3. Northeastern Swiss German Vowel-Lowering ([o] > [ɔ])

Regarding the preconsonantal [o] > [ɔ] change in northeastern varieties of Swiss German, it can be said in overview that this lowering (and apparent laxing) originally occurred only pre-rhotically (= / __r), but that most relevant dialects now lower before a much larger and more disparate range of consonants. In villages whose dialects show lowering also before, e.g., all obstruents except [b], this kind of generalization via simultaneous dephoneticization and phonologization appears to serve sociolinguistic ends: that is, such villages seem to have exploited the mechanism of overgeneralization ("hypercorrection") familiar from Labov (1972; cf. also Janda & Auger 1992) in order to reinforce their local identities.

The (sub)dialects in question are spoken in the cantons of Schaffhausen, Thurgau (Thurgovie), St. Gall(en), Appenzell, and Graubünden (Grisons). The overall high degree of phonological variation between and among the relevant village dialect-groups, though usually accompanied only by minor differences between neighboring villages within any one group, has long attracted the attention of phonologists (including structuralists like Moulton 1960, dialect-atlas compilers like Hotzenköcherle & Trüb (eds.) 1962: 41, and generativists like Kiparsky 1968 or Robinson 1976). The most useful source is Keel (1982: 42-85, 96-98, with earlier references there); perhaps most striking is the lowering-pattern found in Schaffhausen, which was described by Wanner (1941: 26-29). Thus, all Schaffhausen varieties reflect lowering of closed-*o* to open-[ɔ]

before *r*, but each of them has also generalized this rule in various ways; these generalizations fall into four lowering-patterns, summarized by Keel (1982: 49-50) as follows:

(5) Canton-of-Schaffhausen [o]-Lowering Generalizations —

a. in the city of Schaffhausen proper, [o] > [ɔ] before *r* and nasals (but not obstruents);

b. in 13 villages, [o] > [ɔ] before *r*, nasals, and coronal obstruents (but not other obstruents);

c. in 17 villages, [o] > [ɔ] before *r* and coronal obstruents (but not other obstruents, or nasals);

d. in 5 villages, [o] > [ɔ] before *r*, coronal obstruents, and non-coronal obstruents except *b* (but not nasals).

Based on such patterns and on other data (cf. the references above), it emerges that the original sound-change at work in the canton of Schaffhausen (and many neighboring areas; cf. the overview in Keel 1982: 42-46, 66-78) was a lowering of *o* only before *r*. The lowering in question was then extended — differently in different (sub-)dialects — to other phonological environments (defined by a following sound), in ways that sometimes obey implicational principles (e.g., non-coronal obstruents condition lowering only if coronal obstruents do) but often are independent (e.g., obstruents and/or nasals can freely be triggers or not).

Crucial here is the fact that the various generalizations of the *o*-lowering rule do not involve environments which, for articulatory or auditory-acoustic reasons, would be expected to favor a lowered (open-)[ɔ]. As already emphasized above (in concurrence with Ohala 1974, 1989, 1993, etc., and Anderson 1981), it is only the very earliest, allophonic beginnings of sound-changes that tend to show absolute phonetic ("natural") motivation, and so the phonologization of any inherent perception- or production-oriented tendency of the human vocal/auditory apparatus normally requires that such a (psycho)physical characteristic be exaggerated in some way.

In this way, Ohala (1989: 191) argues that listeners' "hypo-corrections" and "hyper-corrections" of perceived speech must play a far more significant role in the origin of sound-change than any alleged ease of articulation or perception (cf. also Ohala 1993). This is consistent, too, with Labov's (1972: 165) view that "sublinguistic fluctuations" precede sound-change, which itself yields ultimate regularity. In fact, it could thus be said (cf. Janda 2000: 305) that "sound-change tends to ... [remain] regular, not due to persistent influence from some kind of articulatory or auditory/acoustic phonetic naturalness, but instead because exaggerations and misperceptions of phonetic tendencies tend to involve stepwise generalizations based on the natural classes of phonology" (i.e., the abovementioned coronals, nasals, obstruents, and the like). The reasons for these (over)generalizations can be sought in the social-group-marking function so often brought to light in sociolinguistic research. For instance, in discussing the mechanism of sound-change, Labov (1972: 160-182) characterizes the third stage in terms of a situation involving "hypercorrection from below" (i.e., below the level of — explicit — social awareness): "...[s]ucceeding generations of speakers within the same subgroup [as the speakers originating the change], responding to the same social pressures, carr[y]... the linguistic variable further along..., beyond the model set by their parents...[, so that] the variable is now defined as a function of group membership and age level". The situations labeled by Labov as the final (seventh and eighth) stages in such "[sound-]change from below" also involve extensions.[5]

From a "Big Bang" standpoint, then, the lowering before [r] was the "big bang", and the subsequent non-phonetically-driven, phonological, and sociolinguistic generalizations represent the aftermath of this event, corresponding to stage (d) in the model sketched in (3) above.

4. Contemporary English s-Retraction to [ʃ]

Finally, we turn to the present day for what appears to be a relatively recent innovation in English,[6] though one which seems to be increasingly frequent, and thus apparently spreading. At

issue here is the pronunciation of a canonical /s/, formerly [s], with a retracted, somewhat alveopalatal, [ʃ]-like "shibilant" realization, especially within clusters, as in [ʃ]*treet* (vs. the variant [s]*treet*, with an alveolar sibilant). For some speakers, this particular cluster can now even be realized as [ʃr-] (i.e., without ...[t]...). Discussion of this development in the literature is surprisingly sparse: Labov (1984: 50) remarked on this pronunciation for Philadelphia English — and not just for African-American Vernacular English [AAVE] (overall) — and, more expansively, Janda, Joseph, & Jacobs (1994), Shapiro (1995), and Lawrence (2000) have discussed it, as well. But the general focus of these studies has been primarily on the context involving [s] > [ʃ] only before [tr] (though with some further consideration of [s] > [ʃ] before [tj]).

What is interesting about this development, from the perspective advocated here, is that it is spreading, not just in the sense of being characteristic of (seemingly) more and more speakers, but also in that the contexts for the retraction are being extended. Labov (1984: 50) first noted this wider occurrence of the retraction of /s/ for Philadelphia, and it was reported on in Janda, Joseph, & Jacobs (1994: 80), as well: "We have recorded some speakers for whom the phonological distribution of this innovative initial /ʃ/ has expanded from words with initial *str-*, like *street*, to *r*-less forms like *stone* and even to *sk*-initial words like *skill*, particularly when the preceding word is pronounced with a final [r] (as in *their* [ʃ]*kill*)". Such pronunciations are admittedly sporadic, in the sense that not every current speaker of English has this [ʃ]-realization, and even those who have it do not necessarily have it categorically (i.e., at all times). But our impression[7] is that this pronunciation is getting to be strikingly rampant, and spreading to ever more contexts. A sampling of the forms we have collected is given in (6):

(6) Innovative [ʃ] in English Clusters Other Than / __*tr* —

a. with [r] preceding: *under*[ʃ]*tand* / *thunder*[ʃ]*torm*;

b. before [r] alone: *di*[ʃ]*respect*;

c. before a stop other than [t], with [r] following it: [ʃ]*creen* / [ʃ]*prinkler*;

d. before a(n oral) stop or a nasal, with no [r] involved: [ʃ]*till*, [ʃ]*chool*, [ʃ]*mall*.

There is some lexically determined variation in at least American English between /s/ and /ʃ/ in certain words of German or Yiddish origin, such as *spiel*, *glockenspiel*, or *s(h)pritz*, where at least some generally non-retracting speakers nonetheless have [ʃ]. There is perhaps a sociolinguistic dimension to the variation in such words, since knowledge of (or at least perceptions regarding) the origin of a word (i.e., the source language of borrowings) may well play a role in whether one pronounces these words with a more German-like [ʃ] or a more (canonical) English-like [s]. While this is surely a different phenomenon in origin from the retraction more generally at issue in this section, the two may ultimately merge, and the innovative clusters with [ʃ] may eventually subsume the lexically specific instances just discussed here; if so, the foreign flavor that [ʃ] now seems to have in such words can be expected to be lost as *s*-retraction spreads (for more discussion of the "foreign" affinities of palatal shibilants, see Janda, Joseph, & Jacobs 1994: 80).

In any case, it is not just [ʃtr] clusters that are to be found now, and therefore it is unlikely that this phenomenon overall is a distant assimilation to [r], as Shapiro has suggested (however plausible this may seem within the very circumscribed context /__tr),[8] or a local assimilation to an affricated realization of /tr/,[9]. Still, given that the most robust effect seems to be found with *str-*, the cluster that first attracted linguists' attention, it is reasonable to surmise that this represents the point of origination for this innovation. Further, from the viewpoint of a "Big Bang" model, the occurrence of the relevant retraction in the wider contexts noted in (6) reflects an early, proto-generalizing stage for the innovation, where a nucleus of phonetic conditioning — with regularity on a highly localized basis — is undergoing rapid expansion along various paths (in this case, phonologically determined ones), with some lexical and even sociolinguistic conditioning now being relevant, as well.[10] One can speculate regarding whether the shibilants in Modern Standard

High German *stehen* 'to stand', *spielen* 'to play', and the like may reflect similar generalizing from an original change once limited to words like *Strasse* 'street', but this is at present no more than a hunch on our part.

5. Summation Regarding Sound-change

Each of the three present case-studies, therefore, is consistent with — and thus, by demonstrating feasibility, provides support for — the perspective afforded by a "Big Bang" model of sound-change. Moreover, the model itself provides answers to the issues raised at the outset, rephrased here as questions and summarized in (7) — along with satisfying (we are tempted to say "definitive") answers following each, given in italics:

(7) Solutions to the Issues Raised in (1) —

a. What range of conditioning factors is typically relevant at the onset of the change?: *Phonetic factors exclusively, and no other type.*

b. Does the same conditioning last throughout the evolution ("lifespan") of the change? *No, at least not necessarily (unless the change is very short-lived).*

c. What types of alterations in this conditioning are possible? *Besides altered phonetic analyses, there are generalizations to non-phonetic conditions: phonological, morphological or lexical (= morpholexical — i.e., "grammatical"), or sociolinguistic, and combinations thereof.*

d. Do such alterations prevent successive instantiations from counting as the "same" change? *This question presumably remains open, but it is not obvious that much hinges on it.*

e. How long does the change remain "active"? *Not long at all, since the sound-change (i.e., the innovation) is a/the "Big Bang".*

f. Can (and should) the change's point of origin be distinguished from its spread / diffusion? *Yes, most emphatically!*

g. Exactly where in the course of the change do the purely phonetic conditions recognized by the Neogrammarians hold? *At the outset, definitely (see (7a) immediately above); possibly further on, as well, if that is the relevant path of generalization (see (7c) immediately above).*

Thus, in its purely phonetic manifestations, sound-change is ephemeral, though fully regular within narrow bounds: in fact, the narrower and more circumscribed the original context is, the better we can define and determine the likely associated regularity. Moreover, sound-change rapidly yields to generalization along non-phonetic (phonological or morphological) and social lines that may contribute further regularity via extension to broader contexts. Consequently, it is fair to say that the Neogrammarians were generally right about sound-change, but not exactly as they or Labov (1981, 1994) envisioned.

In many cosmologists' view of the early universe, the original "Big Bang" took place over 13 billion years ago, but virtually all of the major developments which it entrained were completed within the first three minutes (again cf., e.g., Weinberg 1993). It is now the turn of diachronic phonologists — and phoneticians — to determine how long the initial phonetic conditioning and phonetic regularity of a sound-change tends to last before it yields to other sorts of regularity and, ultimately (if only eventually), irregularity.

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The validity of Bloomfield's dictum is clearest for unconditioned changes; conditioned changes pose greater challenges, however.

[1] In a sense, then, regularity can be recognized through attention to micro-detail in conditioning, since this means, typically, that not many candidate forms are eligible for a given innovation. It is important to keep in mind that a sound-change can be regular even if applies to only a handful of forms, as long as that handful exhausts the set of potential forms. Thus, being "regular" here is not to be confused with being widespread or numerous (or general).

[2] As Andersen (1989: 12-13) aptly puts it: "the word 'change' has commonly been employed ... not to describe anything going on in the object of inquiry — language in diachrony — but rather to sum up a reified version of the linguist's observations". We observe further that because the output of one sound-change can be affected by a myriad of other sound-changes, we seriously doubt that any particular correspondence could ever be legitimately deemed "impossible" (of course, whether a particular correspondence is probable or not, or whether it is frequently instantiated, is an altogether different matter).

[3] In this way, we are in sympathy with the spirit of Picard's (1994: 18) suggested principle of minimality ("Sound changes are always minimal, and so can involve no more than one basic phonetic property"). We take issue in part, however, with his particular instantiation of this idea, due both to the vagueness of some of the constructs that he employs (especially the notion "basic phonetic property") and to its lack of empirical content (especially if one can get out of any potential problem simply by introducing another step in the relevant development).

[4] At least for Spanish, too, we can venture a prediction here. A sociolinguistic dimension in *e*-prothesis may well emerge in the way that loanwords are pronounced (cf. the discussion of *spiel*, etc. in section 4 below) , since those Spanish speakers with the greatest knowledge of English — and the most near-native experience in using it — should in principle be able to pronounce a

loanword like *smog* without prothetic *e-*. This would introduce into Spanish the possibility of variation within a speech community based on knowledge external to the original language-system (i.e., on knowledge about the language of origin for certain loanwords), and so could ultimately endow *e*-prothesis with a very different character from that found in the present state of the language (not to mention the primeval nature of prothesis in early Romance). Our hunch along these lines is unconfirmed by any direct evidence that differentiation of this sort already exists, so we mention it only as a representative topic for possible further research — i.e., as something to listen for.

[5] For an analysis of phonemic split which combines two of the just mentioned sorts of mechanisms by linking Labov's (1994) "generational change" with Ohala's (1993) "hypo-correction" and "hyper-correction", see Janda (1999, 2002), with a focus mainly on (Old) High German umlaut.

[6] The dating of this development is actually somewhat tricky. Lawrence (2000) suggests that it may have its origins in the 19th century, and Joseph (to appear) speculates that the current situation with [s/ʃ] variation in clusters could reflect the "bubbling up" to the surface of long-suppressed variation in West Germanic — in which case the contemporary situation discussed here would be the aftermath of an older innovation. The issue of whether the present situation thus counts as the "same" change as some 19th-century impetus, or even as a Proto-West-Germanic one — if there is any substance to the speculations just mentioned — echoes the question raised in (1d) above and addressed below in our conclusion.

[7] This is the impression of others, too. Many of the students who were assigned the task of listening for examples of this development as part of our co-taught Linguistics 801 (Historical Phonology) course, offered in the summer of 2000 at the Ohio State University, recorded numerous instances of [ʃ]*treet*, etc. Interestingly, though, there were some students who did not encounter (or were unable to perceive) such examples. A readily available example of [ʃtr] can be heard in the pronunciation of *strong* as [ʃ]*trong* by a young Australian actor playing the role of the boy Lucius

in the recent (2000) film *Gladiator* (this pronunciation occurs a little more than halfway through the film, when the title character is brought to the Colosseum in Rome).

[8] We suspect that what may be most crucial about the presence of *-r-* in the core environment for the relevant change is not so much its retractedness (with retroflection or bunching of the tongue) as its rounding (cf., e.g., Ladefoged 1993: 65 on lip rounding and English /r/). The spread of such rounding across a cluster to its initial *s-* would then represent anticipatory (local) assimilation; the resulting rounded sibilant could then interpreted as [ʃ] (see Ladefoged 1993: 63 on the tendency for lip rounding with English [ʃ]). We note also that Lubker & Gay's (1982) research on anticipatory coarticulation of consonants before *u* in Swedish and in English found that labiality in Swedish may occur up to 500 milliseconds prior to the articulation of *u*, but in English only up to 100 milliseconds prior to an *u*. This finding shows that two (relatively) closely related language-varieties can differ in the timing of anticipatory labiality, and so it would not be surprising to find differences between varieties of English in this regard — e.g., as we seem to see with [ʃ] vs. [s] preceding *tr* in clusters. I.e., speakers apparently differ in whether or not they have a rounded sibilant as the initial segment in a cluster whose labiality emanates (into and through medial /t/) from its final consonant, /r/.

[9] Lance & Howie (1997: 356) note that a "fronto-palatal"-affricate occurs in /tr/ for many dialects of at least American English (e.g., beginning spellers sometimes write *chrain* rather than *train*), but it is not clear that one finds such affrication after a sibilant. That is, (alveo)palatal affrication of the /t/ in *str* and its assimilatory anticipation by the preceding /s/ should in principle yield [ʃtʃr], but we are not familiar with any reports documenting this pronunciation — which in any case would need one or more clean-up rules/processes in order to yield attested [ʃtr].

[10] Moreover, this additional set of contexts for retraction — i.e., other than just before /tr/ — means that purely structural factors involving the distribution of [r] and other resonants vis-à-vis [s] and [ʃ] (a set of considerations which Barry Blake urged us to consider) cannot be the primary cause for

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the retraction at issue. That is, if sibiliant retraction were evident only in the enviroment before /tr/, one might be inclined to think that the complementary distribution of the sibilants occurring in words such as *shrimp*, with [ʃ] before [r], versus *slump*, with [s] before [l], would allow the [ʃr] cluster to be analyzed as underlying /sr/, with an active retraction-process responsible for any surface cluster(s) with [ʃ]. However intriguing such a possibility may be, it is clear that, if there exist cases of retraction with no [r] involved at all, as noted in (6d), then there must be more going on here than just structural (distributional) factors. Similarly, speakers with *shpritz* (with [ʃ]) but *sprinkle* (with [s]) cannot have grammars in which all ʃ-forms derive from an underlying /s(C)r/. Finally, there are dialects — for example, at least some varieties of African-American Vernacular English — which have [s-] even in "canonical" /ʃC-/ words: e.g., in [srɪmp] for *shrimp*. In future work, we plan to investigate two further possibly relevant additional considerations bearing on sibilant retraction in English [ʃ]*treet*, etc. The first of these involves the heightened potential for cross-dialectal reinterpretation as /ʃ/ of some Southern U.S. dialects' retroflex(-like) — and hence more [ʃ]-like — /s/'s (cf., e.g., the pronunciation of *Texas* by George W. Bush) when they occur before *tr*. The second consideration involves the possibility that increasingly frequent affrication to [ts] of English aspirated [tʰ] could already be entraining a push chain whereby the fronter [s]-part of [ts] leads to a backer (more retracted) perception of original /s/, especially in clusters.