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Red, black, and white hearts: ‘heart’, ‘liver’, and ‘lungs’ in typological and areal perspective

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Abstract: On the basis of a sample of 424 languages or dialects, this article provides a typological-comparative investigation of designations for three major internal organs of the torso, the ‘heart’, the ‘liver’, and the ‘lungs’. While colexification patterns are relatively unconstrained, the data show a skewing in morphologically complex terms: ‘heart’ and ‘liver’ often serve as head nouns in complex terms for ‘lungs’, but the reverse is rare. Another recurrent phenomenon is that two of the organs –sometimes ‘heart’ and ‘lungs’, but more frequently ‘liver’ and ‘lungs’– share their head noun, and are distinguished from one another by modifiers that refer to their most salient characteristics, as in Azerbaijani *ay žiyær* ‘white žiyær’ = ‘lungs’ and *gara-žiyær* ‘black-žiyær’ = ‘liver’. Having thus set the typological stage, I move on to discuss two different regions of the world in which such terms for ‘lungs’ and ‘liver’ have spread through language contact. This has happened in Eurasia, where the abovementioned pattern, which I call “explicitly dyadic”, was brought from Turkish to vernaculars of the Balkans and, most likely through Azerbaijani influence, to languages of the Southern Caucasus. Similar explicitly dyadic terms, but based on a head noun meaning ‘heart’, also occur in the Andes, where they appear to have spread from Quechuan to Barbacoan languages. The evidence not only shows that ‘liver’ and ‘lungs’ form a “semantic dyad” in which designations make use of “opposed characteristics” in different regions of the world, but also that such designations are salient and therefore prone to spread in language contact situations.

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1 Introduction

The semantic and morphological structure of lexical items is among the many aspects of language that can be affected by language contact. This is nothing new and has been known to linguists for quite some time (e.g. Betz 1949; Weinreich 1953). Yet, as contributions to the present special issue and others such as Enfield (2003) show, it is only recently that areal-typological patterns in the lexicon and their genesis through language contact are being studied on a larger scale. Thus, it appears that we are now truly on our way towards an areal semantics (Matisoff 2004), with systematically studied data from a given region or even the world at large. Accordingly, it is not surprising that methods akin to those of sample-based linguistic typology are used to describe and evaluate relevant data (Gast and Koptjevskaja-Tamm 2019). Research in areal patterns in semantic and morphological structure of lexical items is thus a sibling of the equally burgeoning field of lexical typology (see e.g. Koch 2001; Viberg 1984, and contributions in Juvonen and Koptjevskaja-Tamm 2016; Koptjevskaja-Tamm and Vanhove 2012; Vanhove 2008). In this article, which deals with designations for three major internal organs –‘heart’, ‘lungs’, and ‘liver’– in a typological and language contact perspective, I touch upon both interlocking fields of research. I begin in Section 2 with a discussion of colexification patterns in terms for ‘heart’, ‘liver’, and ‘lungs’.¹ This section draws upon a systematic language sample for the world-wide assessment of the frequency and distribution of the possible configurations in which designations of the organs may be associated lexically.

A major finding of research in lexical typology is that the same semantic associations between concepts tend to show up in various formal guises: they may be realized by colexification in one language and by morphologically complex terms in another. And, given the close association between synchronic polysemy and diachronic semantic change, they may be visible diachronically as lexical items change their meaning (see Urban 2011, 2012).² As morphologically complex

¹ I use the term colexification in a manner that appears to be becoming more and more standard in lexical typology, namely as a deliberately ambiguous cover term for polysemy and vagueness in broad studies where this relevant distinction cannot be readily made. The term is originally due to François (2008).

² The term “semantic shift”, with the specific meaning with which it is used in the Russian tradition of lexical typology where it covers all three realizations (e.g. Zalizniak et al. 2012), also seeks to capture this insight.

terms also play an important role in realizing the lexico-semantic associations among 'heart', 'liver', and 'lungs', this part of the lexicon fits squarely into this multidimensional web of associations. In Section 2, I will also work out more systematically a special dyadic relation between 'liver' and 'lungs' that opposes these organs along three major semantic axes.

Then, in Section 3, I zoom in on one salient pattern in the sample which is found in Eurasian languages: some languages, principally of the Balkans, Turkey, and the Caucasus, feature terms for 'lungs' and 'liver' which are based on the same root, but which are distinguished by modifiers meaning 'white' for the 'lungs' and 'black' for the 'liver' respectively. This pattern appears to have spread in Eurasia to the Balkans and the Caucasus through Turkish and Azerbaijani influence. With this background, I discuss a likely case of structural borrowing from Quechuan to languages of the Barbacoan family in Section 4. In this case, the same opposition in color is involved, but the head noun as a simplex denotes the 'heart'. Together, the evidence shows that such naming strategies are salient enough not only to recur in completely unrelated regions of the world, but also to spread through language contact in Eurasia, and likely also in South America. Section 5 provides a summary and general discussion.

2 'Heart', 'liver', and 'lungs' in typological perspective

I will begin with a broad, sample-based assessment of the lexico-semantic associations between terms for 'heart', 'liver', and 'lungs'. Data come from my own database of lexico-semantic associations (Urban 2012, 147 languages, 132 of which have complete datasets) and the Intercontinental Dictionary Series (IDS, Key and Comrie 2015,³ 300 datasets, of which 278 are complete). This gives 447 datasets, 410 of which are complete. Because of overlaps between the databases, this amounts to data for 424 distinct languages or dialects. All data can be found in the supplementary materials. Both datasets are global in coverage, though the IDS data, reflecting the interests of its editors, are biased towards the Caucasus and South America. Data from North America come almost exclusively from the Pacific Coast; Africa is represented by only three languages, and Australian and Papuan languages are not covered at all. The sample of Urban (2012) is more balanced areally, but also not free entirely of biases. In sum, the sample used here is a mere convenience sample.

3 As archived at <https://zenodo.org/record/4280608#.YMiWFkxCSUk>.

Table 1: Colexification patterns for ‘heart’, ‘lungs’, and ‘liver’. Languages exhibiting colexification may have alternative terms for specific organs.

	Cahuilla (Uto-Aztecán, California, cahu1264, Seiler and Hioki 1979 in Urban 2012)	Polci (Afro- Asiatic, Nigeria, polc1243, Cosper 2015)	Buin (South Bougainville, Papua New Guinea, buin1248, Laycock 2003 in Urban 2012)	Kwoma (Sepik, Papua New Guinea, kwom1262, Bowden 1997 in Urban 2012)	Chukchi (Chukotko- Kamtchatkan, Russia, chuk1273, Fortescue 2005 in Urban 2012)
‘lungs’	<i>yávayna</i>	<i>vaktarak</i>	<i>muruge</i>	<i>wopu, hiiriibu</i>	<i>ratralʔan</i>
‘liver’	<i>yávayna</i>	<i>mbatl</i>	<i>turupa</i>	<i>wopu</i>	<i>pontə</i>
‘heart’	<i>súnĩl</i>	<i>mbatl</i>	<i>muruge</i>	<i>wopu, mesek</i>	<i>linliŋ</i>
No. of lan- guages of this type in the sample	3 ^a	7	5 ^b	2	Remainder

^aLitteral (nd.) glosses Anggor (ango1254) *hutiri* as ‘lungs or liver?’. If this were counted as a case of colexification the count would rise to 4.

^bIn Yay (bouy1240), *tuən*² is a term for “inner organs (the heart and lungs, sometimes including the liver)” (Gedney 1991). I have counted this term as colexifying ‘heart’ and ‘lungs’ only. Yir Yoront *ngerr-lolt* ‘lungs’, which is “given fairly consistently also for ‘heart’” (Alpher 1991: 255), was also counted.

Many, in fact most, of the sample languages have distinct forms for the three organs. Other languages, however, group the organs together lexically (or “colexify” them) in different manners. As it happens, all five logically possible ways by which this may be done are attested. The patterns can be represented in a kind of Hjelmslevian semantic mini-map (Haspelmath 2003: 237; Hjelmslev [1943] 1969: 54), as in Table 1.

Sampled languages in which all three meanings can be covered by a single lexical item are Kwoma and Khoekhoe (nama1264). In both, the relevant items appear to be autohyponymous (Becker 2002): they denote one organ –the ‘liver’ in Kwoma and the ‘stomach’ in Khoekhoe– specifically and the inner vital organs broadly. In both languages, there are additional terms that denote the individual organs narrowly. In their broad reading, relevant terms seem akin to English *innards* or *offal*.

The distribution is less even when it comes to morphologically complex terms in which a word for one of the three organs forms the head noun for another one. Table 2 provides a quantitative overview of the relevant data from the sample with examples of each attested type. The counts reflect all cases where a word for one of the three organs forms the head noun of a complex designation for another one, even if the modifier cannot be identified. For instance, in Tuyuca (Tucanoan, Colombia and Brazil, tuyu1244) *biʔki-yēbē-diti* is ‘lungs’. This term is clearly based

Table 2: Patterns of lexical associations between ‘heart’, ‘liver’, and ‘lungs’ by morphologically complex terms.

Head noun: ‘lungs’	Head noun: ‘liver’	Head noun: ‘heart’
‘lungs’ – ^a	13 (9) Hup (Naduhup, Brazil, hupd1244) <i>hɔ wowōw</i> ‘liver wring.out’ (Epps 2009 in Urban 2012)	9 (6) Dargwa (Usisha dialect; Nakh-Daghestanian, Russia, nucl1774) <i>urk’i miqir</i> ‘heart chest’ (Khalilov 2015c)
‘liver’ 0	–	1 Imbabura Quechua (Quechuan, Ecuador, imba1240) <i>yana shungu</i> ‘black heart’ (Gómez Rendón 2009 in Urban 2012)
‘heart’ 1 Waurá (Arawakan, Brazil, waur1244) <i>-ĩwĩ-ɛĩ-</i> ‘breath/lung-cylinder’ (Richards 2015)	1 Mbum (Atlantic-Congo, Cameroon, mbum1254) <i>lâù wârké</i> ‘liver male’ (Hino 1978 in Urban 2012)	–

^aOddly, Yoruba (Atlantic-Congo, Nigeria) has *èdò-fóro* ‘liver-lung’ for ‘lungs’ according to University Press PLC (nd.).

on *yěbē-di’ti* ‘liver’, even though the identity of *bi’ki* remains unclear on the basis of Barnes (2015). Counts in parentheses show only those language where, unlike in Tuyuca, the modifier can be identified unambiguously.⁴

The data in Table 2 show that there is quite some variation with regard to which terms are selected as head nouns: almost all logically possible patterns are attested at least once. At the same time, however, the data also show a striking asymmetry: complex terms for ‘lungs’ on the basis of ‘liver’ are quite frequent, whereas the other, logically entirely conceivable, possibility, i.e. to have terms for the ‘liver’ with head noun meaning ‘lungs’, is the only unattested configuration in the sample. In Koch’s (2008: 120) terms, across languages, the conceptualization of the ‘lungs’ is often dependent on the ‘liver’. Data from Austronesian languages contribute strongly to this finding. And indeed, Blust (2005: 539) reports that in Austronesian languages it is more frequent for the ‘lungs’-words to be based morphologically and dependent conceptually on words for ‘liver’ than the other way around. Probably not coincidentally, the directionality trend in dependent conceptualization appears to match the directional asymmetry of diachronic

⁴ Generally, I have checked if recurrent sequences in terms for the three organs recur widely across the lexicon. For instance, alongside terms for ‘heart’, ‘liver’, and ‘lungs’, a total of 99 more entries in the Yanomámi IDS set (Lizot 2015, yano1261) have *pei* as the initial sequence. This makes it very likely that *pei* is of a grammatical nature, and that its presence in the terms for all three organs does not suggest a particular connection between them.

semantic change in Austronesian languages (Blust 2005: 539–540). Thus, based on the present sample, Blust’s Austronesian findings can be generalized: the relationship between the two is often asymmetrical, with a primacy of the ‘liver’ (and see Trumbull 1874: 31 to that effect).

The observations that can be made on the basis of the sample are not exhausted yet. Another attested configuration is that terms for two of the organs actually share their head nouns, and are distinguished by modifiers. This type of relationship I shall call “explicitly dyadic”. In the sample, this occurs in Araona (Tacanan, Bolivia, arao1248), where ‘heart’ and ‘lungs’ appear to share the head noun *moso*, and are modified by *ho* and *zata* respectively to yield *mosoho* ‘heart’ and *mosozata* ‘lungs’ (Key 2015a). The meaning or function of *ho* is unknown, but *zata* is ‘to float’, referring to the light weight of lungs (as do terms for ‘lungs’ in other languages, see Urban 2012: 657 with further references). Similarly, in Wayampi (Tupian, Brazil, waya1270) *tuluākā* is ‘heart’ and *tuluēwiy* ‘lungs’, which latter appears to contain *wēwiy* ‘float, light in weight’ (Grenand and Alasuka 2015). Araona and Wayampi are the only two languages in the sample that have terms for ‘heart’ and ‘lungs’ that share their head noun.⁵ Actually, it is much more frequent for ‘lungs’ and ‘liver’ to pattern together in

Table 3: Explicitly dyadic terms for ‘liver’ and ‘lungs’ in the language sample.

Language/ Glottocode	Family	Country	‘lungs’	‘liver’	Reference
Azerbaijani, nort2697, sout2697	Turkic	Azerbaijan, Russia	<i>ay</i> <i>žiyær</i>	<i>gara-</i> <i>žiyær</i>	Khalilov (2015a)
Kryz, kryt1240	Nakh- Daghestanian	Azerbaijan	<i>läzi</i> <i>lähkän</i>	<i>lähä</i> <i>lähkän</i>	Khalilov (2015f)
Kumyk, kumy1244 (Kajtak Tumenler dialect)	Turkic	Russia	<i>aq</i> <i>bowur</i>	<i>qora</i> <i>bowur</i>	Khalilov (2015g)
Lezgian, lezg1247 (Quba dialect)	Nakh- Daghestanian	Azerbaijan	<i>lacu</i> <i>(žiger)</i> <i>leq’</i>	<i>č’ulow</i> <i>leq’</i>	Khalilov (2015j)
Bulgarian, bulg1262	Indo-European	Bulgaria	<i>bjäl</i> <i>drób</i>	<i>čéren</i> <i>drób</i>	Vakareliyska and Horissian (2015)
Romani (various)	Indo-European	(various)	<i>buko</i> <i>parno</i>	<i>buko</i> <i>kalo</i>	Kenrick (2015)

⁵ In the Khanag subdialect of Northern Tabasaran (Nakh-Daghestanian, Russia, taba1259; Khalilov 2015k) ‘liver’ is *lik* while ‘heart’ is *yik*. These are etymologically related, as the initial consonants reflect frozen noun class markers (Sharafutdin Dashdemirov pers. comm.). Diachronically, thus, explicitly dyadic terms for ‘liver’ and ‘heart’ can be identified in this dialect.

this way. Blust (2005) speaks of ‘lungs’ and ‘liver’ as a “semantic dyad” in Austronesian languages. Table 3 shows languages that exhibit an explicitly dyadic relationship between ‘liver’ and ‘lungs’ together with their genealogical affiliation, the country they are (mostly) spoken in, as well as the actual terms.

At this point, one can already conclude that the dyadic relationship between designations for ‘lungs’ and ‘liver’ is not a specifically Austronesian lexico-semantic pattern (and in fact Blust makes no claim to that effect). Indeed, most of the observations Blust makes for Austronesian appear to be generalizable beyond that family: in the lexicon of the world’s languages, ‘lungs’ and ‘liver’ are commonly associated organs; the association is ubiquitous in the sense that it appears to occur in languages of many parts of the world.

What are the characteristics that are used to establish the dyadic relationship; in other words, what is the meaning of the modifiers? Anticipating Blust’s Austronesian “semantic dyad”, Matisoff (1978: 153) speaks of a system built on “opposed characteristics” in Tibeto-Burman. “The liver is heavy, compact, of dark color; the lungs light, spongy, pale,” as Trumbull (1874: 31) summarized the linguistically relevant distinctions between the two succinctly. Indeed, the data from the sample reveals that, typologically speaking, three main linguistically relevant opposed characteristics can be distinguished: (i) color (liver: black/dark, lungs: white/light), (ii) texture (liver: hard, lungs: soft), and (iii) weight (liver: heavy, lungs: light).⁶

Especially frequent seems to be (i), the opposition by color. Thus, in the sample, we find that in Bislama (English-based Creole, Vanuatu, bisl1239) the ‘lungs’ are called *waet-leva* ‘white/bright-liver’ (Crowley 2003). Also, this opposition appears to be the one that is most frequently relevant in explicitly dyadic terms: elucidating the semantics of the modifiers involved in the terms in Table 3, they uniformly mean ‘black’ or ‘dark’ for the ‘liver’ and ‘white’ or ‘light’ for the ‘lungs’, thus Azerbaijani *ay žiyær* ‘white žiyær’ = ‘lungs’, *gara-žiyær* ‘black-žiyær’ = ‘liver’, and *mutatis mutandis* for the other languages.⁷

As for (ii), the opposition by way of texture, languages repeatedly mark the ‘lungs’ explicitly as ‘soft’ when compared to their dyadic counterpart, the ‘liver’. For instance, in the present sample, Fijian (fiji1243) has *yatevuso*, which is approximately translatable as ‘foam liver’ (Capell 1957). However, no sampled language exploits the texture opposition by explicitly dyadic terms (i.e. marked by modifying elements on a head noun that appears to cover ‘lungs’ and ‘liver’ non-distinctively).

⁶ Pertinent data in Zauner (1902), Matisoff (1978), and Blust (2005) corroborate this further.

⁷ For the Kajtak Tumenler dialect of Kumyk, ‘black’ is actually given as *qara*, whereas the modifier is *qora* in *qora bowur* ‘liver’ (Khalilov 2015g).

As for (iii), opposition by way of weight, this naming strategy has also been frequently noted and commented upon (and indeed is reflected also in the English term *lights*). In the sample, it is represented for instance by Hawaiian (hawa1245) *ake-māmā* ‘liver-light’.

Before turning to a closer look at the Eurasian cases from a language contact perspective in the following section, it is necessary to stress the high variability of the actual designations. Characteristically, while the three major opposed characteristics sketched out above are often made use of cross-linguistically, there is a halo of variation around them. Pertinent terms are clearly different, but bear a family resemblance to the three strategies just sketched. We have already seen that, for instance, in Yir Yoront (Pama-Nyungan, Australia, yiry1245), the head noun of the relevant item is not ‘liver’, but a word for another organ, the ‘heart’. Otherwise, quite a few languages have complex motivated terms for ‘lungs’ based on those for ‘liver’, but with modifiers that are not covered by the three opposed characteristics sketched above; Hup, as we have seen, has *hɔ wowōw* ‘liver wring out’. Finally, the sample also shows that one of the three opposed characteristics can be used to denominate ‘lungs’ and ‘liver’ by morphologically complex items, but without a constituent element that actually denotes either. In Chickasaw (Muskogean, USA, chic1270), for instance, *ishoppaya* ‘lungs of an animal’ is derived from the verb *shoppaya* ‘be light’ (Munro and Willmond 1994, chic1270), and there is no dyadic relationship with the ‘liver’, which is designated by an unrelated term.

3 Matter and pattern replication in Eurasia

Returning to the data from the present sample in Section 2, it is notable that the languages showing the lightness opposition in the characteristic dyadically marked form all come from Eurasia, more specifically, eastern Europe and the Southern Caucasus. The map in Figure 1 shows the distribution of explicitly dyadic marking for ‘liver’ and ‘lungs’ in the sample with black dots.

In the sample, we find two languages of eastern Europe, Bulgarian and Romani, with the relevant dyadically marked terms *bjál drób* versus *čeren drób* and *buko parno* versus *buko kalo*, respectively. This finding can be elaborated on with recourse to extant literature, which provides more detail both on the distribution and the emergence of the clustering of the pattern in the Balkans. Hamp (1973: 310) remarks that “in folk speech in the Balkans” –thus not necessarily in the standard varieties, from which the data for the sample come– “one frequently finds but one lexeme to cover the meanings ‘liver’ and ‘lungs’; the two notions are readily disambiguated,

Figure 1: Sample languages with explicitly dyadic marking for ‘liver’ and ‘lungs’ and languages reflecting Persian *gīger* for either ‘liver’ and ‘lungs’. Map data is for illustration only, based on the view of the IDS data at <https://ids.cld.org/contributions> (Key and Comrie eds. 2015). Locations are approximate; not all Caucasian languages are shown.

when this is required, by the addition of the elements ‘black’ and ‘white’, respectively”. Hamp (1973: 310) also provides a short account of the origin of these similarities: “These parallel locutions”, he says, “obviously calque the Turkish (nucl1301) *kara-ciger* and *ak-ciger*”. *Kara-ciğer* is ‘liver’, and *ak-ciğer* ‘lungs’.⁸ In a manner that runs precisely parallel to the close relative Azerbaijani that is featured in the present sample, *kara* and *ak* refer to black and white hues, while *ciğer*, the common head noun of both compounds, appears to be ambiguous by itself as to which of the two organ it denotes.⁹ That contact rather than independent innovation is in play in the Balkans case is shown by a detail provided by Hamp: in Albanian varieties that have not been drawn into the Balkan Sprachbund, such as those in southern Italy (arbe1236), distinct lexical items survive as a conservative trait. In the Balkans, thus, the observed situation is due to pattern replication (Matras 2009), i.e. the spread of the explicitly dyadic pattern of naming ‘liver’ and ‘lungs’ by means of the color opposition.

A second cluster of relevant terms is observed in the Caucasus, especially the southern ranges. As noted in Section 2, the IDS data are biased towards the Caucasus, so, taken by itself, it would not be surprising that any particular pattern in the data should manifest itself there by the sheer laws of chance.

Nevertheless, there is reason to believe that chance is not the main agent here either. Relevant evidence comes from the fact that the pattern copying of explicit dyadic marking for ‘liver’ and ‘lungs’, while following its own trajectory, is not entirely decoupled from matter copying (Matras 2009), i.e. borrowing of lexical items. The head noun of relevant terms in Turkish and Azerbaijani is a borrowing from Persian *ğiger* ‘liver’ (Hamp 1974: 148; Leschber 2011: 48). Different layers of Turkic-Iranic language contact can be discerned (Doerfer [1991]2012) that provide a suitable background for the transfer of the form from Persian to Turkic languages. As far as this particular term is concerned, borrowing must have occurred in or before the 14th century (van Donzel et al. 1997: 327). Persian *ğiger* must be the ultimate source also for *žiger* in the Quba dialect of Lezgian. Languages with forms that ultimately must derive from Persian *ğiger*, without any dyadic relationship being established, are found in the sample in the same regions where pattern replication of explicitly dyadic terms for ‘liver’ and ‘lungs’ is attested. In the Balkans, one finds Serbo-Croatian (sout1528) *džigerica* ‘liver’ (alongside the native

⁸ The Turkish case is actually well known and frequently cited, including in the typologically oriented discussions of Matisoff (1978: 155) and Blust (2005: 542).

⁹ To one native speaker of Turkish who I have consulted with, the simplex *ciğer* evoked primarily a dish (the main ingredient of which apparently is liver meat) and only then the ‘liver’ itself. When confronted with *ak-ciğer* and *kara-ciğer*, these were considered to be terms pertaining to human anatomy specifically.

jetra, Corin 2015), and in the Caucasus, Laz (lazz1240) has *cigeri* ‘lungs, liver’ (Johanna Mattissen with Sevim Genç pers. comm. in Urban 2012), Khinalug (khin1240) *žigār* ‘lungs’ (Khalilov 2015e), Lezgian (standard and Mikrakh dialect) *žiger* ‘lungs’ (Khalilov 2015h, 2015i), the Terekeme dialect of Azerbaijani (tere1273) *čiger* ‘lungs’ (Khalilov 2015b) and Judeo-Tat (jude1256), “the traditional language of the Mountain Jews of the eastern Caucasus Mountains, especially Azerbaijan and Dagestan, now mainly spoken in Israel” (Wikipedia) has *žiger* ‘liver’ (Khalilov 2015d). The close association with a particular form which spread through the same region and sometimes even forms the head noun of explicitly dyadic terms for ‘lungs’ and ‘liver’ makes a chance distribution unlikely.

It is not clear how exactly the pattern diffused in the Caucasus. However, it would seem highly plausible to look for an origin in the national language Azerbaijani rather than the other Caucasus languages involved, which have fewer speakers and are more restricted geographically. This is supported by several independent lines of evidence. The first is the sociolinguistic situation in Azerbaijan, past and present. Azerbaijani acted and acts as a local lingua franca. “Turkic languages were highly influential in the Caucasus and Anatolia”, and the people of South Daghestan are typically bilingual in Azerbaijani specifically (Dobrushina 2017: 560–561, and further references therein). In Azerbaijan itself, Azerbaijani’s sociolinguistic position is so strong that speakers of Kryz are currently shifting to Azerbaijani, and “the level of Azerbaijanian influence on Kryz is very high” (Dobrushina 2017: 563, 569). The second piece of evidence is the empirical observation that the copying of lexical matter *and*, crucially, pattern is typically from lingua francas to local languages rather than the other way around (Brown 1996, 2011), a pattern observed in the Caucasus, too (Daniel et al. nd.). These two observations already point to Azerbaijani as the vector of the spread of the pattern to languages of the Caucasus. This is corroborated by a third, independent piece of evidence, namely the geographic distribution of explicitly dyadic terms for ‘lungs’ and ‘liver’ in the Caucasus, which shows a strong north-to-south cline. Their notable clustering in the Southern Caucasus where Azerbaijani acts as a lingua franca, and its weaker presence as one moves north, where Azerbaijani does not act as a lingua franca, is consistent with a pivotal role of that language. In fact, within the Nakh-Daghestanian family, Dobrushina (2017) is able to demonstrate a north-to-south cline that is highly similar to that observed for explicitly dyadic terms for ‘lungs’ and ‘liver’ and reflexes of Persian *žiger* also in the use of volitionals in complement clauses. Both patterns become stronger as one moves from the northern Caucasus southward into Azerbaijan, an observation that Dobrushina interprets as indicating Azerbaijani influence. In sum, the geographical distribution of explicitly dyadic terms for ‘lungs’ and ‘liver’ matches that of an independent syntactic variable where Azerbaijani did act as a vector for contact influence.

Together, these observations make a role for Azerbaijani in the diffusion of explicitly dyadic terms for ‘lungs’ and ‘liver’ very probable.

However, in spite of this, one might question the role of Azerbaijani, or more generally Turkic languages, as a vector of pattern replication in the Caucasus and the Balkans. This is because the closely related Turkish and Azerbaijani languages, rather than acting as pattern donors, could theoretically have been drawn into a preexisting areal pattern of the Caucasus and the Balkans as well. However, there are again several pieces of evidence that speak against this. As stated above, this scenario would go against the sociolinguistic roles as *lingua francas* and the typical role of *lingua francas* as pattern and matter donors rather than receivers. However, there are more problems with this idea. It would raise the question as to how the pattern came to exist both in the Balkans and the Caucasus with their distinct cultural and historical trajectories. An origin in Turkic, concretely Turkish and Azerbaijani, can account for this commonality easily. Furthermore, assuming that these languages acted as vectors of pattern replication can explain how lexical material that is ultimately of Persian origin can end up in both Balkans and Caucasus (recall that the pattern is intertwined with matter borrowing, the ultimate source of many relevant (head nouns of) forms being Persian *ġiger*). Thus, much evidence speaks against this alternative scenario. One can furnish an additional test to decide between the two alternatives based on comparative Turkic evidence. If Turkish and Azerbaijani were drawn into a pre-existing areal pattern, one would expect *not* to find explicitly dyadic terms for ‘lungs’ and ‘liver’ in closely related Turkic languages that are spoken outside the implicated regions, i.e. the Balkans, Turkey, and Azerbaijan. To the contrary, if they acted as vectors of pattern spread, and the pattern is hence older in these Turkic languages than in other languages of the Balkans and Caucasus, then we might expect to find it also in Turkic languages outside these regions. Turkish and Azerbaijani pertain to the Oghuz branch of the Turkic languages, which also includes the Gagauz (gaga1249) language of Moldova, Turkmen (1304), and a series of minority languages of mainly Iran and Afghanistan, including Salchuq (salq1238), Qashqa’i (qash1240), and Khorasani Turkish (khor1269) (Johanson 2009: 1,109). Now, Bodschnurdi (no code), a Khorasani Turkish dialect of northeastern Iran, spoken close to the border with Turkmenistan and thus well to the east of the implicated regions, has *aybaŋıŋr* ‘lungs’ and *Ġarābaŋır* ‘liver’ (Fázsy 1977: 302). Structurally, these terms are parallel to the ones in Turkish and Azerbaijani (except that, here, the head noun is a native Turkic word, not a loan from Persian). This shows that dyadically marked terms for ‘lungs’ and ‘liver’ are encountered in the Oghuz languages broadly rather than being restricted to Turkish and Azerbaijani, a final piece of evidence that makes scenarios in which a pivotal role of Turkish and Azerbaijani in pattern replication is not assumed much less likely than ones in which it is.

4 Pattern replication in the Andes

In the New World, slightly different explicitly dyadic terms for ‘lungs’ and ‘liver’ are found in Quechuan. Quechuan is a widespread, if shallow, language family of Andean South America, spoken from southern Colombia into northernmost Chile and Argentina on the longitudinal axis, and from the highlands into parts of the lowlands of Ecuador and Peru respectively on the latitudinal axis. The received theory of the family’s internal structure (Parker 1963; Torero 1964, see Heggarty 2005 for a divergent view) suggests a division into two main branches: Quechua I is restricted to Central Peru, where the family’s homeland is also thought to have been located, while Quechua II is the expansive branch of the family to which both Quechua varieties to the north and the south belong. It is likely that the Inca Empire (ca. 1438–1532 AD) was a significant agent in the spread of Quechuan into the most peripheral regions of its distribution, i.e. Colombia and perhaps Ecuador in the north and Bolivia and Argentina in the south. Quechuan likely gained a significant number of speakers in late (i.e., Incaic) prehistory and early colonial history as people who once must have spoken unrelated languages shifted to Quechuan. The present sample features data from two Quechua varieties, Ancash (huay 1240), spoken in the highlands of North-Central Peru and belonging to Quechua I, and Imbabura Quechua, a Quechua II variety of the Ecuadorian highlands. Both varieties feature dyadically marked terms for ‘lungs’ and ‘liver’ that make use of the color opposition, as seen in Table 4.

As one can see, the Quechuan pattern differs from the Eurasian cases. Here, the ‘heart’ is involved, too. In both varieties, the designation of the ‘heart’ is

Table 4: Terms for ‘heart’, ‘lungs’, and ‘liver’ in Ancash and Imbabura Quechua.

	‘heart’	‘lungs’	‘liver’	
Ancash Quechua, chiq1249 etc.	<i>shunqu</i> ~ <i>shonqu</i> , <i>puywan</i> ~ <i>puywaq</i>	<i>yuraq shunqu</i> ‘white heart’, <i>yuraq ñatin</i> ‘white liver’	<i>kukupi</i> , <i>ñatin</i> , <i>yana ñatin</i> ‘black liver’	Carranza Romero (2003) in Urban (2012)
Imbabura Quechua, imba1240	<i>shungu</i>	<i>yurak shungu</i> ‘white heart’	<i>yana shungu</i> ‘black heart’	Gómez Rendón (2009) in Urban (2012)

inherited from proto-Quechua *šunqu (Emlen 2017).¹⁰ Reflexes of *šunqu are not only central to Quechua conceptions of anatomy, but also to the organization of the lexical field at large (Urban 2018a). Thus, in Ancash Quechua, ‘liver’ is either *ñatin* or *yana ñatin* ‘black liver’. This apparently redundant form becomes interesting when contemplating the words for ‘lungs’, which can be either *yuraq ñatin* ‘white liver’ or indeed *yuraq shunqu* ‘white heart’. Such complex terms which establish a dependent conceptualization in Koch’s (2008) sense are exploited almost to the extreme in Imbabura Quechua according to Gómez Rendón (2009), which thus manages to cover the entire semantic space of four major internal organs of the torso with just one morphologically basic noun which is combined with modifiers for differentiation. The simplex *shungu* denotes (at least) the ‘heart’ in this variety. The ‘lungs’ are called *yurak shungu*, literally ‘white heart’, while both ‘kidney’ and ‘liver’ are *yana shungu* ‘black heart’.

Cross-linguistically, the Quechuan cases are somewhat atypical. Judging from the data of the sample, it is quite common to have complex designations for the ‘lungs’ with ‘heart’ as their head nouns (see Table 2). The sample features relevant data from the Tupian family of the South American lowlands: Guaraní (chiq1249, etc) has *neʔã veʔvui* ‘heart float’, and Sirionó (siri1273) *ečĩã mebi* ‘heart light’ (Dávalos de Céspedes and Krivoshein de Canese 2015; Key 2015b). In the case of Imbabura Quechua, in contrast, complex terms for ‘lungs’ and ‘liver’ are based on a word for the ‘heart’. This appears to be quite unusual, and in fact, Imbabura Quechua is alone with a ‘heart’-based liver term in the sample (see Table 2). Imbabura Quechua, one of the northernmost representatives of the Quechuan family, thus represents a highly characteristic case of explicitly dyadic marking for both ‘lungs’ and ‘liver’ with recourse to the color opposition on the basis of a term for ‘heart’.

It is therefore remarkable that, among the sampled languages of this part of the Andes, it is not alone. Relevant terms are also found in Guambiano (guam1248) and Totoró (toto1306), two closely related Barbacoan languages of the highlands of Colombia which are jointly also referred to as Nam Trik. While the Quechuan family is widespread but shallow, Barbacoan is geographically more restricted, but “deep” (as evidenced by low cognacy rates in basic vocabulary, see Curnow and Liddicoat 1998). Other extant Barbacoan languages include Awa Pit (awac1239), spoken in the highlands of the Colombian-Ecuadorian border area, as well as

10 As discussed in more detail in Urban (2018a), ‘heart’ is only a very approximate gloss. Indeed, both intension and extension differ considerably at least in traditional Quechua which is not attuned to Spanish lexical semantics (Mannheim 2015). For ease of reference, I gloss reflexes of *šunqu as ‘heart’ in the remainder of this article, but it should be remembered that this may only be a rough translational equivalent.

Cha’palaa (chac1249) (a.k.a. Cayapa) and Tsafiki (colo1256), which jointly form the Southern Barbacoan branch, on the Pacific-facing side of the Andes in Southern Ecuador. In Guambiano, ‘heart’ is *mantɕi* and ‘liver’ is *jali mantɕi*, literally ‘black heart’ (Huber and Reed 1992). In Totoró, ‘heart’ is *mac* and ‘liver’ *jali’mac*; ‘black’ is given as *ja’litik* (Huber and Reed 1992). Unlike in Guambiano, a complex term for ‘lungs’ on the basis of that for ‘heart’ is also found in Totoró: *kaf’mac*; the meaning of *kaf’* is not retrievable from Huber and Reed (1992). The Guambiano and Totoró lexical material is native, but, where transparent, mirrors the abstract pattern of denomination of the relevant Quechuan varieties not only in that they recruit ‘heart’ for ‘liver’, but also in that they instantiate the dyadic relationship between ‘lungs’ and ‘liver’ by the color opposition.

“Disentangling universal tendencies from local patterns that witness convergence” (Koptjevskaja-Tamm et al. 2017; see also Koptjevskaja-Tamm and Liljégren 2017) is a major issue especially in lexical typology where still so little is known systematically. In the particular case of ‘liver’ and ‘lungs’, which is relatively well explored, it is clear that both the Quechuan and Barbacoan denominations play on a typological stage. And yet, the Andean cases are unusual in that it is the ‘heart’ rather than the ‘liver’ that is recruited for explicitly dyadic dependent conceptualizations via the color opposition. It is remarkable that such a typologically unusual configuration, occurring only in Quechuan in a worldwide sample of more than 400 languages and dialects, recurs at least for the ‘liver’ in unrelated languages spoken in close proximity.

In order to explore the distribution of the pattern in more detail with a view towards assessing if a contact-based explanation of the occurrence of the pattern in Quechuan and Barbacoan is feasible, I have gathered supplementary data from as many languages as possible in the Ecuadorian and Colombian Andes and the adjacent lowlands. These data are also found in the supplementary materials and are, together with relevant data from the original sample, mapped in Figure 2.

The supplementary sample confirms the strong presence of explicitly dyadic marking, the head noun consistently being the word for ‘heart’, in Ecuadorian Quichua generally as well as in the Colombia Quechuan varieties called Inga (inga1252).¹¹ Table 5 shows the additional Quechuan dialectal data.

Data from these dialects show the halo of family resemblances that is typical for the patterns of designations discussed in this article. Firstly, to various degrees the dialects have borrowed the Spanish terms *corazón* ‘heart’, *pulmón(es)* ‘lung(s)’ and *higado* ‘liver’. Secondly, colexification coexists with explicit dyadic marking across Ecuadorian Quichua and Colombian Inga (colo1257). In Inga, Cañar

¹¹ Reflecting changes in pronunciation, Quichua is the conventionalized spelling of the Quechuan varieties of Ecuador and Santiago del Estero (sant1432).

Figure 2: Patterns of naming 'liver' and 'lungs' in the Ecuadorian and Colombian Andes and adjacent lowlands. Map is for illustration only. Locations are approximate and based on coordinates as given in Glottolog 4.0 (Hammarström et al. 2019).

Highland Quichua (cana1270), Loja Highland Quichua (loja1235), and Tena Lowland Quichua (tena1240) the simplex *shungu* or *sungu* colexifies 'heart' with 'liver'. A third variable is the modifiers in complex terms, as when in Loja Highland Quichua *putu* replaces the adjective 'white' as the modifier in the complex term for 'lungs'.

Table 5: Terms for ‘heart’, ‘lungs’, and ‘liver’ in Ecuadorian Quichua and Colombian Inga.

	‘heart’	‘lungs’	‘liver’	
Inga (inga1252)	<i>sungu, kurasun</i>	<i>iura sungu</i>	<i>sungu, iana sungu</i>	Tandioy Jansasoy et al. (1997)
Southern Pastaza Quechua (sout2990)	<i>shunku, kaw-sana shunku</i>	<i>samana, walsa shunku</i>	<i>yana shunku</i>	Tödter et al. (2002)
Chimborazo Highland Quichua (sout3334)	<i>shungu</i>	<i>yuraj shungu, pulmunis</i>	<i>yana shungu</i>	Stark and Muysken (1977)
Salasaca Highland Quichua (sala1284)	<i>shungu, curasun</i>	<i>yuraj shungu</i>	<i>yana shungu</i>	Stark and Muysken (1977)
Cañar Highland Quichua (cana1262)	<i>shungu, curasun</i>	<i>yuraj shungu, pulmun</i>	<i>shungu, yana shungu, ígadu</i>	Stark and Muysken (1977)
Loja Highland Quichua (loja1235)	<i>shungu</i>	<i>putu shungu</i>	<i>shungu</i>	Stark and Muysken (1977)
Tena Lowland Quichua (tena1240)	<i>shungu, curasún</i>	<i>balsa</i>	<i>shungu, yana shungu</i>	Orr and Wrisley (1965)
Napo Lowland Quichua (napo1242)	<i>curasún</i>	<i>pulmu</i>	<i>shungu</i>	Landerman (1973)

Of most interest for present purposes, however, is the observation that explicitly dyadic terms for ‘liver’ and ‘lungs’, with ‘heart’ as head noun, are restricted to Quechuan and Barbacoan languages in the Ecuadorian and Colombian Andes.

More generally, complex terms for either of the three organs in which another acts as head noun are quite rare in this region. For Cogui (Kogi) (cogu1240), a Chibchan language of the Sierra Nevada de Santa Marta of Northern Colombia, Huber and Reed (1992) give *əbbítə* as ‘liver’ and *abbítá-súna* as ‘lungs’ respectively. The head noun of the latter term, *abbítá*, may be identical to *əbbítə* ‘liver’, even though this is not entirely clear. A clearer case is presented by Nasa Yuwe (a.k.a. Páez) (paez1247), a linguistic isolate spoken in the immediate vicinity of Nam Trik, which has *me’cy shũ* and *me’cy shwawa* for ‘lungs’, *me’cy* being the term for the ‘liver’ (Slocum and Gerdel 1983). *Shwawa-* is a verb denoting the purling sound of a flowing river; the word for ‘heart’ does not seem related to these in any relevant way (Slocum and Gerdel 1983). Nasa Yuwe, and perhaps Cogui, thus, appear to instantiate the frequent tendency for complex terms for ‘lungs’ to be based on those for ‘liver’ that was carved out in Section 2. This suggests that here we are dealing with an independent typological phenomenon that need not be related to the repetition of the Quechuan pattern of designating the ‘liver’ in Nam Trik.¹²

12 However, since indeed Nam Trik and Nasa Yuwe share some lexical material (Curnow 1998) and therefore are or were clearly in contact, it cannot be ruled out that Nasa Yuwe must ultimately be included into a scenario of loan translation involving denominations for the ‘liver’ and ‘lungs’ in the Andes.

Given the strong geographical clustering and the absence of comparable designations for ‘liver’ and ‘lungs’ with ‘heart’ as head noun in other languages of the Ecuadorian and Colombian Andes it seems plausible to assume that pattern replication is involved in bringing about the distribution of explicitly dyadic terms for ‘liver’ and ‘lungs’ in the Colombian Andes, too. More specifically, the strong presence of the pattern in Ecuadorian Quichua and Colombian Inga generally suggest that the Nam Trik designations were coined on the basis of a Quechuan template. This is consistent with the observation that Awa Pit colexifies ‘lungs’ and ‘liver’, while Cha’palaa and Tsafiki have distinct terms for both organs (Huber and Reed 1992) and that, accordingly, there is no evidence that Nam Trik inherited the pattern from a common ancestor.¹³ A Barbacoan origin of the pattern is not entirely inconceivable either, however. In the highlands of Ecuador, Barbacoan languages probably once extended farther south to at least the area of Quito, covering the area which is now the domain of Imbabura Quechua, the Quechuan variety in which the lightness opposition is exploited most strongly. The ethnohistorically known Pasto (past1243) and Cara languages of that region are thought to have been Barbacoan, though the evidence is not strong, especially for the latter (cf. Adelaar with Muysken 2004: 393–394).¹⁴ Thus, the pattern of naming ‘liver’ and ‘lungs’ by explicitly dyadic terms on the basis of ‘heart’ in Inga and Imbabura Quechua could have originated from Nam Trik and/or a now extinct Barbacoan language of the Ecuadorian highlands.¹⁵ A major problem for the postulation of a Barbacoan influence on Quechuan, however, is the presence of *yuraq shunqu* in Ancash-Huailas, a Quechua I variety of Central Peru which, as far as is known, has never been in contact with Barbacoan languages. The Ancash evidence therefore makes a Quechuan origin more plausible. In further support of this, there is ethnohistorical evidence that Quechua was in use near Cali on the Cauca river, one of the inter-Andean valleys in what is now Colombia, in the 16th century (Adelaar with Muysken 2004: 53). This former presence of a Quechuan variety which must have been close to Inga and Imbabura Quechua provides a cornerstone for a contact scenario in which the naming strategies could have been transferred from a northern variety of Quechuan to Nam Trik rather than the other way around.

13 In fact, the word for ‘lungs’ in Awa Pit is attested as *nandunul*, and that for ‘liver’ as *pantunul* (Huber and Reed 1992). As voicing is not phonemic in Awa Pit (Curnow 1997: 23–24), these seem to be differing phonetic transcriptions of a single colexifying item.

14 Barbacoan languages may once even have extended up to the southern Ecuadorian Andes (Cañar and Azuay provinces), see Urban (2018b) for discussion of the evidence.

15 That the lightness opposition in naming ‘lungs’ and ‘liver’ is also exploited in Santiago del Estero Quichua, in northwestern Argentina (Bravo 1977; Urban 2018a), would only be puzzling if it were not known that Santiago del Estero Quichua is based on a mix of several varieties that may have included Ecuadorian ones (Adelaar 1995).

5 Summary and discussion

The ‘heart’, the ‘liver’, and the ‘lungs’ are organs that are associated lexically in some languages of the world. While the association is not particularly frequent, a convenience sample of 424 languages or dialects shows that either colexification or morphologically complex terms, in which designations for one of the organs is formed on the basis of another one plus a modifier by dependent conceptualization (Koch 2008), occur throughout the world. The ‘lungs’ stand out by being particularly frequently expressed by complex terms on the basis of either ‘heart’ or ‘liver’ (perhaps reflecting different affordances for human use, different size (Urban 2012: 310), and different overall ‘salience’). The semantics of modifiers also tends to recur across related and unrelated languages in different regions of the world. In complex terms, it is particularly the ‘liver’ and ‘lungs’ which form a “semantic dyad” (Blust 2005) not just in Austronesian, but in languages in many parts of the world, distinguished by the three main characteristics of texture, weight, and color. It appears that the repeated independent occurrences of these patterns derive precisely from the possibility of conceptually opposing these organs along several parameters, whether this is reflected in actual designations or not: as Blust (2005: 543), who argues that in Austronesian the association is closely linked to the butchering of animals, pigs in particular, says, “[t]he physical similarity of porcine liver and lungs in terms of shape no doubt would have prompted comparisons, and their differences would have naturally led to seeing them as an opposed pair”.¹⁶ Recourse to “naturalness” of perceptual cues, “strikingness” of designations, or “saliency” of relevant features of the referent (cf. also Brown and Witkowski 1981) always leave me somewhat unsatisfied, though I can do no better than Blust either, except to add that another relevant factor is that the organs are essentially contiguous spatially and also contextually.

Evidence from the Balkans, the Caucasus, and the Andes shows that patterns of lexico-semantic organization that recur cross-linguistically are also prone to spread through language contact. In the Balkans, the spread of explicitly dyadic terms for ‘lungs’ and ‘liver’ to vernaculars was mediated through Turkish influence according to Hamp (1973); in the Caucasus, a prominent role of Azerbaijani may be surmised; and in the Andes, Quechuan influence on Barbacoan seems the most likely scenario. In all cases, thus, the donor languages are (locally) widely spoken ones that are or were used as second languages by native speakers of more localized languages with fewer speakers.

¹⁶ Also in the diachrony of the semantic field of internal organs in Quechuan, animal body parts appear to play a role at several levels (Urban 2018a).

Pattern copying could be recognized in the Balkans on the basis of standard varieties, but a really informative account required additional information from Hamp (1973). The finely sampled Caucasus region (and also the Quechuan data from the Andes) show that relevant variation occurs on the dialectal level. This underscores the need for dense samples in lexical typological work that seeks to explore areal patterns. Generally, the high variability even across very closely related dialects and the diachronic semantic instability of terms for ‘heart’, ‘liver’, and ‘lungs’ suggest that the designations are often in a state of flux or at least less strongly conventionalized than the codification of form-meaning associations in a dictionary or lexical database may suggest.

There is also ample room for linguists and perhaps cognitive psychologists to come up with better and deeper descriptions of the factors that make explicitly dyadic marking attractive. However, it seems likely that the same factors are at play in the coinage and in the spread of relevant designations. The dominance of visual perception over tactile impressions, which are required to sense the relative weight and texture of both organs, may be part of the explanation for why it is particularly terms which exploit the lightness opposition that spread. This dominance would contribute to making this pair of opposed characteristics more obvious for language users (and indeed, primacy of vision over other senses in the lexicons of the world’s languages can be expected from Viberg’s (1984) study of perception verbs).

In diagnosing pattern copying in the Andes, typological informedness has played a significant role. Since in both relevant Quechuan varieties as well as in Barbacoan it is the ‘heart’ rather than the ‘liver’ that is the basis for complex terms for ‘liver’ and ‘lungs’, a cross-linguistically rather unusual situation, the case for a contact scenario is strengthened. Making a case for pattern copying between Quechuan and Nam Trik, in turn, has enabled us to identify a remnant of an earlier contact situation that ceased to exist centuries ago.

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