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TECHNICAL REPORT

Arab Sign Languages: A Lexical Comparison

Kinda Al-Fityani

Department of Communication, University of California, San Diego

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John Lewis and Jenny Staab, Editors
Center for Research in Language, 0526
9500 Gilman Drive, University of California, San Diego 92093-0526
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Vol. 17, No. 1, March 2005

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Vol. 15, No.3, December 2005

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CRL & Institute for Neural Computation, UCSD
Kim Plunkett
Experimental Psychology, University of Oxford
Jennifer Aydelott
Psychology, Birbeck College, University of London)
Vol. 18, No. 1, June 2006

Avoid ambiguity! (If you can)
Victor S. Ferreira
Department of Psychology, UCSD
Vol. 18, No. 2, December 2006

Arab Sign Languages: A Lexical Comparison

Kinda Al-Fityani

Department of Communication, University of California, San Diego

Abstract

This article is a cross-linguistic examination of Al-Sayyid, Jordanian, Kuwaiti, Libyan, and Palestinian sign languages. It investigates the degree of lexical similarity between these languages to determine whether they belong to the same sign language family. Findings demonstrate that sign languages in the Arab world are varied and are unlikely to be related. I argue that this ls likely due to cultural and social practices in the Arab world that have led to a higher than average incidence of deafness within some communities due to consanguinity. But public education for deaf children in the Arab region was not established until the mid-20th century. As a consequence, sign language development in this region exists largely outside the domain of deaf institutions. Instead, family and tribe play a larger role. This case is distinct from Europe and North America , where the establishment of deaf institutions since the 18th and 19th centuries respectively has been instrumental to the history of Western sign languages.

Introduction

The Arabic language is remarkable for both its uniformity and its diversity. Hundreds of millions of inhabitants of twenty-two countries across the Middle East and North Africa speak it.[1] However, should a Yemeni and a Tunisian meet, it is unlikely that their Arabic would be intelligible to each other. The Arab world is then characterized by pervasive "diglossia," a language situation in which regional dialects are spoken alongside a highly codified written language. Dialects of spoken Arabic can be divided into two main classes: the Eastern dialects of Egypt, Sudan, and the Middle East, and the Western dialects of the remaining North African nations (Mayfield Tomokyo et al., 2003). The vowel and stress systems are what differentiate these two classes. The dialects may be further subdivided into Gulf, Levantine, Maghrebi, and Egyptian/Sudanese. The Gulf dialect is used by inhabitants of southern Iraq, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. The Levantine dialect is used by Arabs living in the north of Iraq, Jordan, Lebanon, Palestine, and Syria. The Maghrebi dialect is that of Arabs in the remaining North African states. Of the Arabic dialects, the Egyptian dialect is most widely understood by Arabs, since Arab cinema and other entertainment media has been largely based in Egypt and involving Egyptian actors throughout the past century. Should a Yemeni and a Tunisian meet, therefore, they can resort to the dialects of movie stars to understand each other. They could also use the highly codified language of Modern Standard Arabic (MSA), which is used by newscasters and in educational institutions. Although it is the mother tongue of no one, MSA is the official literary standard of all Arab countries and is the only form of Arabic taught in schools at all stages. Indeed, colloquial Arabic, as the aforementioned dialects are often referenced, mostly used in spoken form and is only rarely found in a written form. In addition to education, MSA is prevalent in government and news media, allowing Arabs to communicate with and understand each other across nations despite varying regional dialects. It is then taken for granted that being a part of an Arab community goes hand-in-hand with sharing a common language, despite regional varieties.

Many assume a likewise standardized form of sign language being used among deaf Arabs across the Arab world. Yet, research in other areas of the world indicate that sign languages do not map out exactly with spoken languages. Indeed, English-speaking countries such as Australia, Canada, New Zealand,

[1] The 22 members are Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen (League of Arab States, nd).

the United Kingdom, and the United States have different signed languages. McKee and Kennedy (2000) find that Australian Sign Language (Auslan), British Sign Language (BSL), and New Zealand Sign Language (NZSL) are dialects of a single parent language, BANZSL (British, Australian, and New Zealand Sign Language), as is anecdotally evidenced. In a lexicostatistical analysis of random vocabularies, they conclude that the three languages belong to the same family tree but are dissimilar enough to qualify as dialects. Other research reveals that Mexican Sign Language (LSM) and Spanish Sign Language (LSE) are distinct languages despite a common spoken language being shared between the two respective countries (Currie et al., 2002). With respect to the Middle East, Abdel-Fattah (2005) has suggested that the presence of a standard Arabic spoken language has led to an expectation for a standard sign language in the region. Indeed, several people within the Jordanian deaf community have shared with me a similar opinion that while there may be differences between sign languages of the Arab world, they are largely similar. This paper seeks to test this common belief, held among hearing and deaf communities of the region, that sign languages of this region are closely related. It examines potential relationships between sign languages in the Arab world through lexicostatistics, a method of comparing vocabulary across sign languages to determine type and extent of language relationship, if any.

Abdel-Fattah (2005) notes that efforts to standardize sign language within individual Arab countries are under way despite the fact that there may be almost as many sign languages as there are Arab countries. He observes that although spoken Arabic is diglossic, sign languages in the Arab world are not. Unlike in spoken Arabic, one standard form of Arabic sign language does not exist, even though there are currently efforts to develop a standard variety. In a piece on points to consider when undergoing sign language standardization projects, Zeshan (forthcoming) criticizes efforts at standardizing sign languages in the Arab world for a number of reasons including that such a standard variety is not the natural language of anyone. Despite his assertions, Abdel-Fattah continues to refer to the sign languages of the Arab world in aggregate form, suggesting that even if they are not the same languages, they still share many similarities.

At least three ongoing circumstances predispose sign languages in the Arab world to diversity. First, as Walsh et al. (2006) describe below, certain marriage traditions are common in the region,

> The unique demographic history of the Middle East has led to many [endogamous] communities. For more than 5,000 years and continuing to the present, the eastern shores of the Mediterranean have seen immigration of people from a wide variety of cultures. Villages were often established by a few extended families and, despite their geographic proximity, remained demographically isolated. For centuries, marriages have been arranged within extended families in these villages, leading to high levels of consanguinity and consequently high frequencies of recessive traits. (p. 203)

The common practice of endogamy has resulted in a high incidence of genetic deafness in the Arab world compared to exogamic societies, where deafness is more likely the result of disease than of genetic inheritance. Shahin et al. (2002) document that while approximately one in one-thousand infants worldwide are born with hearing loss, communities with high levels of consanguinity have especially high frequencies of inherited childhood deafness. They state: “prelingual hereditary hearing impairment occurs in the Palestinian population at a frequency of approximately 1.7 per 1,000 and is higher in some villages” (Shahin et al, 2002, p. 284). This means that in Palestine, the frequency of deafness is 70% higher than the global average.

From reports of sign languages in such communities, they are not confined in usage to places where deaf people congregate, such as educational institutions or local clubs for the deaf, instead they are extensively used in family and community settings. As Groce (1985) illustrates in her medical history of nineteenth-century Martha’s Vineyard where there was a high incidence of deafness, sign languages are likely to flourish in such communities as deaf people and hearing people use signed communication on a regular basis. Kisch (2004) provides the case of the Al-Sayyid community in the Negev, where consanguineous marriage is common and frequencies of hearing loss is high at 3% of the population due to genetically recessive traits of profound prelingual neurosensory deafness within an isolated community. Kisch states that in this community the “use of a local indigenous sign language is widespread and shared by hearing and deaf people alike” (p. 28). Sandler, Meir, Padden, and Aronoff (2005) also write of this community,

> Members of the community generally recognize the sign language as a second language of the village. Hearing people there routinely assess their own proficiency, praising those with greater facility in the language… One result of [recessive deafness] is that there is a proportionately large number of deaf individuals distributed throughout the community. This means that hearing members of the community have regular contact with deaf members and that, consequently, signing is not restricted to deaf people. (p. 2662)

Second, cultural and social circumstances provide security to sign languages in the Arab world. With genetic deafness, sign languages are able to survive in a more stable manner as it is passed on across generations within a family, compared to other regions of the world where genetic deafness is more rare. Where deafness is a result of disease, the deaf person's chances of learning a sign language are limited to not only having access to an educational institution for deaf people but to one that supports the use of sign language in education as opposed to the more popular oral method. Indeed, sign languages have often been threatened with extinction since a resolution was passed at the 1880 World Congress of the Deaf in Milan on the education of deaf people, supporting "the incontestable superiority of speech over signs" (Lane, Hoffmeister & Bahan, 1996). Sign languages were then banned from usage across educational institutions for deaf people in Europe and the United States. In the United States, this situation abated in the 1970s but not in favor of ASL. Total Communication, or using "all means available to communicate" which typically resulted in signing and speaking at the same time, became the dominant philosophy of deaf education (Lane, Hoffmeister & Bahan, 1996). While deaf activists since have made important strides, with colleges and universities recognizing the legitimacy of ASL, educational policies at school districts are generally hostile to it. For example, standardized tests continue to be in English, a second language for deaf people, making it difficult for them to access higher education. In communities with a high incidence of genetic deafness, however, sign language survival is not dependent on formal institutional policies. As with spoken languages, sign languages that are passed on from one family generation to the next would be valued as essential to family well-being, lending them stability outside political realms.

Third, cultural, social, political, and economic circumstances lead sign languages in the Arab world to be regionally isolated from one another. Marriage customs in the Arab world give preferential treatment for partners from the same region as they share more in common such as dialect and customs. Moreover, political factors of immigration regulations within Arab countries make it difficult for nationals of one region to travel to another. For these reasons, a Jordanian woman is more likely to marry a man from the Levant as opposed to one from a Gulf state. This is because she would need a visa to travel to Dubai, for example, but not one to travel to Damascus or Beirut. Moreover, proximity of Damascus and Beirut to Jordan makes it more economically feasible for a Jordanian woman to meet a man from these cities as opposed to meeting a Qatari man. Inasmuch as cultural, social, political, and economic factors restrict such contact, sign languages in the Arab world would be drawn within boundaries that possibly isolate them and allow them to develop independently from each other. Research on sign languages in the Arab world may then reveal interesting findings on the patterning of sign languages that are used on a daily familial and tribal social basis as opposed to more formalized, institutional basis. It may be hypothesized that isolated sign languages in the Arab world are even less related to each other than other sets of sign languages whose nations share a spoken language.

Background

Past studies on sign languages of the world have attempted to establish relationships between them. The methodology of comparative lexicostatistics is utilized to posit hypotheses on possible historical relationships between sign languages (Crowley, 1992). This is done through a quantitative study of cognates among the vocabularies of the languages under study. Cognates are defined as those vocabularies that are homogeneous enough to be considered as having similar linguistic derivation or roots. While spoken languages have phonological rules in composing syllables from vowels and consonants, sign languages have such rules in the inventory of handshapes, movements, locations, and orientations of the hand. These are called parameters and are compared in vocabularies across sign languages to determine degree of similarity. Many linguists tend to use basic 200-word lists as the basis of their lexicostatistical research as opposed to longer lists, since the method is meant to be a convenient and representative way of sub-grouping languages.

The higher the lexicostatistical percentage between spoken languages' cognates, the closer the historical relationship between the languages as it points to a more recent split from a common parent language (Black & Kruskal, 1997). A language family tree may then be established. Crowley (1992) provides that the lexicostatistical model defines languages to be dialects if they share 81-100% of cognates in core vocabularies. They would be considered different languages, but the same language family if they share 36-81% of cognates, and families of a stock if they share 12-36% of cognates. By "family," lexicostatisticians do not necessarily refer to languages as being descendent from a common ancestor language. Instead, they simply refer to the percentage of vocabularies shared. The assumption behind using the term "family" is that people originate from the same place and, therefore, belong to a common stock. This would not be applicable to sign languages, which have the opportunity to be spontaneously and wholly produced by their respective deaf communities with no predecessors (Sandler et al, 2005). For the purposes of this paper, the term "common stock" is used to mean that different places in the world might have similar gestures or representations for certain objects. For example, the LIU and ASL signs for BOAT are identical across the four parameters. Though we know that the two languages could not possibly be related historically, it may be said that they draw from a "common stock" of gestural and iconic representations. Greenberg (1957) provides four causes of lexical resemblances across languages, only two of which are historically related - genetic relationship and borrowing. Then there is shared symbolism, where vocabularies share similar motivations either iconic or indexic. Finally, lexical resemblances can result from chance. For the LIU and ASL signs for BOAT, shared symbolism would account for the similarity.

Woodward (1978) is one of the first sign linguists to conduct lexicostatistical research on sign languages. He compared the lexicon of French Sign Language (LSF) from a sign language dictionary with ASL, where one set of signs was elicited from an older deaf man and another set from younger ASL signers. He began with a list of 200 "core" words from the Swadesh list, a common tool for anthropologists designed to elicit a basic vocabulary, but excluded pronouns and body parts, since they are indexical and highly iconic, and numerals, because, as Currie et al., (2002) explain, the likely similarity of signs such as ONE or FIVE would lead to overestimation. With 77 words remaining out of the 200 on his list that had counterparts in the LSF dictionary, he found 61% cognates for both sets of comparisons of LSF with the ASL signers. Substituting the modified "core" vocabulary list with all 872 available signs in the LSF dictionary, he found that cognates slightly dropped to between 57.3-58% for both sets of ASL signs. Woodward concludes that contrary to previous sign language studies' assertions that ASL has roots in LSF, it is more likely the case that some sign language varieties existed in the United States before any contact with LSF was made, after which a creolization process took place. Woodward (1991, 1993, 1996) carried out several other lexicostatistical studies using his modified "core" vocabulary list. In many cases, he could not find many vocabulary items in common across sign languages examined, instead evaluating similarity on as little as 42-word lists.

Woodward (1991) compared several sign language varieties found in Costa Rica. With results ranging from between 7-42% cognates, he concludes that there are at least four distinct languages in Costa Rica. In another study, he compared sign language varieties in India, Pakistan, and Nepal with results ranging from 62-71% cognates (Woodward, 1993). He concludes that these varieties are separate languages but belong to the same language family. Likewise, Modern Standard Thai Sign Language and ASL share 57% cognates, making them distinct languages that are related historically because of contact between American deaf educators and deaf Thai Sign Language users (Woodward, 1996). Unfortunately, nowhere in these studies does Woodward note which parameters are taken into account when determining cognates.

McKee et al. (2000) designate vocabularies of sign languages as cognates if all phonemic parameters (handshape, location, movement, and orientation of the palm) are *identical* or if only one parameter is different. Vocabulary that falls in the latter category is designated *related-but-different*, or vocabulary that is considered similar enough to have the same origins. McKee et al. use Woodward's modified "core" vocabulary list of 100 concepts to establish how closely related are NZSL, ASL, Auslan, and BSL. The vocabularies were drawn from dictionaries and CD-ROMs of the respective sign languages. The researchers find that Auslan, BSL, and NZSL shared between 79-87% cognates, designating them as dialects of a parent language. The researchers expected this high degree of similarity, as both Auslan and NZSL have BSL colonial origins, brought to Australia and New Zealand by deaf

immigrants from the United Kingdom. Moreover, there has been contact between deaf people from Australia and New Zealand. This is in contrast to ASL, which has no historical linkages with the other three sign languages and which was hence used as a control group. The researchers were then not surprised to find that ASL shared only between 26-32% cognates with Auslan, BSL, and NZSL, confirming that ASL is a separate language from the other three historically linked languages. This is in contrast to the geography of the spoken language of the respective countries, English.

Yet, McKee et al. (2000) note that some linguistic scholars criticize the method of employing "core" vocabularies, as they argue that "core" vocabularies may overestimate the similarities between the sign languages studied as they are high frequency concepts. As such, other researchers prefer random vocabularies on which to base their lexicostatistical study. Slightly altering Woodward's methodology to double the vocabulary being compared and to include more random vocabulary as opposed to the 200 "core" vocabulary from the Swadesh list, McKee et al. (2000) find that the rate of similarity, or cognates, between NZSL and each of Auslan and BSL drops dramatically to 65.5% and 62.5% respectively. Cognates between NZSL and ASL remained low at 33.5%. The researchers reason that the slightly higher rate of commonality between NZSL and Auslan than that between NZSL and BSL is related to geographical proximity and to historical educational policies in which the New Zealand Department of Education introduced the Australian Total Communication System in 1979 that continued to be used until the early 1990s. However, they find it difficult to make a claim as to whether NZSL is a separate language or if it is, like Auslan, a dialect of BSL. While the first methodology they used found that NZSL was a dialect of Auslan and BSL because it fell within the lexicostatistical range of 81-100%, the second methodology used suggests that NZSL only belongs to the same language family as Auslan and BSL with significant divergence having occurred between the languages. Again, the percentage drop is due to a more random vocabulary list which the researchers assert would be more representative than "core" vocabularies.

McKee et al. (2000) do another level of analysis where they examine only those cognates that differ on one parameter. They find that these *related-but-different* cognates most likely differ on the parameter of handshape, followed by movement, with changes in location and orientation much less frequent. They briefly note that these results tentatively indicate that when languages diverge, handshape is the most common parameter to undergo change.

Unlike McKee et al. (2000), Currie, Meier, and Walters (2002) did not analyze the differences between *related* cognates in their lexicostatistical comparison of LSM against each of LSF, LSE, and Japanese Sign Language (NS). Here, LSM is compared with LSF as there is reason to believe they are historically related. A deaf Frenchman educator arrived to Mexico in 1866 when he first learned of a deaf school being established there. Thus, LSF may be a source of borrowing for sign language(s) in Mexico. With Spanish being a shared spoken language between both Mexico and Spain, it is commonly believed that LSM and LSE would be likewise similar, but there is no opportunity for contact. Sharing no known historical relationship, the comparison of LSM and NS is used as a control group to approximate the possible degree of similarity between two unrelated sign languages. Data for the analysis were retrieved from videotaped elicitations, but it is unclear how the word-list was determined. Word lists ranged from 89 vocabulary items for the LSM-LSE comparison to 112 vocabulary items for the LSM-LSF comparison and 166 vocabulary items for LSM-NS. Concepts were designated as cognates if they shared two out of three parameters. Unlike McKee et al. (2002), Currie et al. (2002) exclude the fourth parameter of orientation. Results found 38% cognates for LSM-LSF, 33% cognates for LSM-LSE, and 23% for LSM-NS. The researchers found these results conform with their expectations. While it is clear to them that LSM and LSF have come into contact, it is similarly clear that their historical development is non-genetic. They attribute the similarity to borrowing. Their findings also do not support anecdotal evidence that both LSM and LSE are similar as they exist within communities that share a spoken language, Spanish. Again, this is a case of a spoken language not mapping on to sign languages, indicating that sign languages develop largely independent of spoken languages. They also conclude that the LSM-NS comparison provides a possible base level of the percentage of cognates between any two sign languages due to shared symbolism. Here, they argue that the visual-gestural modality of sign languages and their capacity for iconic representations promote base levels of similarities between unrelated sign languages to be particularly high.

As can be gathered from the above review of past lexicostatistical research on sign languages, scholars

differ in their methods from the number and nature of vocabularies compared, to their definitions of cognates, to their interpretations of what constitutes belonging to a language family. Nevertheless, these results are instrumental indicators for language planning of these sign languages. McKee at al. (2000) demonstrate how their results have implications for the use of sign language in professional and educational services for the deaf in New Zealand. Whereas it is common practice to bring sign language interpreters from United Kingdom and Australia to satisfy the supply gap in New Zealand, their results indicate that such practice may need to be reconsidered. Knowledge of Auslan or BSL does not translate as knowledge of NZSL, contrary to anecdotal evidence from the deaf community. This is also relevant to the educational sphere, where resources from United Kingdom and Australia are at times imported to schools for the deaf in New Zealand. Given that there is a project underway that seeks to standardize the sign languages of the Arab world, research on sign language vocabularies is needed to establish the kinds of relationships that exist between sign languages of the region. Such research would allow us to explore language and social issues of the region, of which little is known.

Relationships between sign languages of the Arab world may provide a contrasting pattern to that found in the West. While the relationships between sign languages in the United States, Western Europe, and the British colonies are related to the history of schooling as was reflected at the Milan Conference of 1880, where a resolution was passed that barred sign languages from being used in educational institutions in Europe and the United States, schooling was introduced much later in the Middle East. Brother Andrew, a pioneering educator of deaf people in the Middle East, credits Father Andeweg, a fellow Dutch Anglican missionary, with the establishment of the first school for deaf people in the region in Lebanon in the late 1950s. It was there that Brother Andrew first came to the region from the Netherlands to teach deaf people. He remained there several years before transferring to Jordan to resuscitate a deaf school that had been also established by Father Andeweg in 1964 (Holy Land Institute for the Deaf, 2004).

The Holy Land Institute of the Deaf (HLID) in Salt, Jordan is now considered a model school for deaf people in the Middle East. Schools for deaf people in other Arab countries appeared several years, even decades, later. These schools were established by their respective governments and without influences from Europeans. HLID being a rare exception, current curricula in these schools persist in their emphasis on oral methods of communication, which emphasizes speech and lipreading, preferring it to signed communication. Despite these policies, sign languages continue to be used dynamically between members of the deaf community. Given the youth of such institutions for deaf people and their continued advocacy of oral methods for communication, we would expect sign language development in the region to exhibit a different geography from Western patterns.

We may see in the Middle East a distribution of sign languages that is patterned more on regional, tribal, and familial institutions. The case of the Arab world is distinct from Europe and North America, where the establishment of deaf institutions since the 18th and 19th centuries respectively has been instrumental to the history of Western sign languages (Lane et al., 1996). Given the different institutions that shape how sign languages are transmitted across generations, the Arab world may have more sign languages in its region, and more diverse sign languages at that, than in the United States and Europe. This paper will demonstrate language differences through the method of lexicostatistics. The sign languages that will be examined in comparison to Jordanian Sign Language (LIU)[2] are Al-Sayyid Bedouin Sign Language (ABSL)[3], Kuwaiti Sign Language (KSL), Libyan Sign Language (LSL), and Palestinian Sign Language (PSL). These were chosen because there are dictionaries for them from which to draw the data. LIU will also be compared with ASL as a baseline, with the expectation that percentage of cognates will be low due to no known historic relationship between the two. However, as there are Jordanian professionals working with deaf people who have studied in the US as well as a few deaf Jordanians who have studied at Gallaudet University, there may be lexical borrowings from ASL to LIU, which may account for cognates.

I predict that LIU and PSL will have some degree of relationship because of a history of contact between the two regions. Members of the Jordanian deaf community have told me of Jordanian parents who sent their deaf children to schools for the deaf in Palestine because those schools advocated the oral

[2] LIU is the abbreviated form of the Arabic-English phonetic translation, *Lughet il-Ishara il-Urduniyyeh*.
[3] ABSL is used in the Abu Sayyid community in the Negev Desert in Israel.

method of communication. Also, language contact may have resulted from migration between the regions, which was fluid prior to the establishment of the state of Israel. During the 1948 and 1967 wars, the deportation of Palestinians to Jordan numbered in the hundreds of thousands. It can be expected that many deaf people were among those deported. With Israeli restriction of Palestinian movement within Palestine and across the border with Jordan, migration may take the form of relocation due to marriage. Marriage between inhabitants of Palestine and Jordan is common, with over 70% of Jordan's inhabitants being of Palestinian origin.

I also predict that the relationship between LIU-LSL and LIU-KSL will be lower when compared to of LIU-PSL. This is because there is less contact between the regions due to difficulty of mobility between the nations, as well as different familial and tribal traditions that make intermarriage much less common. In Kuwait, for example, polygamy is a much more common practice than it is in Jordan, where polygamy is rare. A Jordanian woman is not likely to accept entering a marriage union with a Kuwaiti man, knowing that there is a possibility she may not be his only wife. Also in Kuwait, segregation between men and women, even within members of a nuclear family, is common, a custom which Jordanians may find difficult to adapt. The political isolation of Libya has made their contact with other Arab nations minimal. The fact that the Libyan spoken dialect of Arabic is markedly different from that of Jordanians' is another reason for weak ties between the two nations.

ABSL is expected to be different from all other signed languages under study, as it is a closed community of Bedouins with little or no contact with neighboring communities. Members of the Al-Sayyid community do not commonly marry members outside their group. This paper expects to show that familial, tribal, and regional factors play a large role in sign language geography in this region.

Methodology

Under the lexicostatistical standard, languages are defined as dialects if they share 81-100% of cognates (Crowley, 1992). They are judged to be of the same language family if they share 36-81% of cognates, and "families of a stock" if they share 12-36% of cognates. Vocabulary used for comparison was drawn from published dictionaries of the respective sign languages, with the exception of ABSL where the vocabulary was elicited through an interview with a deaf member of the Al-Sayyid community on video. Dictionaries used for this study are:

Hamzah (1993) for LIU
Palestine Red Crescent Society (2000) for PSL
Kuwaiti Sign Language Dictionary (1995) for KSL
Suwayd (1992) for LSL
Tennant and Gluszak Brown (1998) for ASL.

All vocabulary items in the LIU dictionary and similarly glossed items from each of the other four dictionaries were used for the comparisons. The reason for such an extensive comparison was that using a modified "core" list or randomly selected vocabularies would have resulted in a smaller set of comparison vocabulary from the Kuwaiti and Libyan dictionaries, or a lack of comparison vocabulary as was the case with the Palestinian dictionary which was targeted towards high school and university students in the math and sciences, or too focused on local references such as names of organizations and royalty as is the case with the Jordanian dictionary. However, the vocabulary items that could be compared are of relatively high frequency when taking into consideration the environment of the Arab region.

Signs of different languages were compared based on four phonemic parameters (handshape, movement, location, and orientation of the palm), following McKee et al.'s (2000) more stringent guidelines. For McKee et al., cognates are signs that share at least three out of four parameters. Non-manual differences such as facial markers were not included in the comparison. In the case of multiple entries for the same vocabulary item, signs most similar to their LIU counterpart were compared.

Also following McKee et al. (2000), I set aside cognates that differed on one parameter only and noted which parameter was different. McKee et al. analyzed these cognates to determine which parameters are likely to change. These results may illuminate a pattern that sheds light on the nature of sign language diversity in the region.

Table 1. Analysis of vocabulary items that are shared between the Jordanian Sign Language (Lughet il-Ishara il-Urduniyyeh; LIU) dictionary and the Palestinian (PSL), Kuwaiti (KSL) and Lybian Sign Language (LSL) dictionaries as well as between the LIU dictionary and Al-Sayyid Bedouin Sign Language (ABSL) elicited signs.

LIU	PSL		KSL		LSL		ABSL		ASL	
	#	%	#	%	#	%	#	%	#	%
Identical	59	35%	40	22%	42	16%	25	15%	28	70%
Related	38	23%	33	18%	49	18%	14	90%	41	10%
Cognates		58%		40%		34%		24%		17%
Different	70	42%	110	60%	176	66%	126	76%	342	83%
Total	167		183		267		165		410	

Results

Two signs from different sign languages were termed *identical* if they shared all four parameters,. They were termed *related* if they differed on only one of four parameters. They were termed *different* if they differed on two or more parameters. As illustrated in Table 1, between 165-410 vocabulary items were examined for the different comparisons. The number of vocabulary items are similar to past comparative research on sign languages. As predicted, LIU-PSL had the highest number of identical and related cognates at 58%, followed by LIU-KSL with 40%, LIU-LSL with 34% cognates, and LIU-ABSL the lowest with 24% cognates.

The parameters in which the signs differed are presented in Table 2. Table 2 indicates that the parameter that is most likely to differ is movement, followed by handshape, orientation, and location.

The results shown in Table 1 suggest that LIU-PSL and LIU-KSL are related but probably not dialects of the same language (same family, but different languages), as their cognates lie within the 36-81% range. As for LIU-LSL, LIU-ABSL, and LIU-ASL, they are possibly not related since they share only 12-36% of cognates. These results provide an example of how the geography of sign languages does not map onto that of spoken languages. Although ABSL, KSL, LIU, LSL, and PSL are languages that exist in Arabic-speaking communities, they are clearly distinct sign languages. Moreover, these results contradict anecdotal evidence that sign languages of the Arab world are mostly similar or are dialects of a single parent sign language. What these results suggest is that sign languages in the Arab world may not have the same origins, or they have diverged greatly over time.

As expected, LIU and PSL share the most cognates of any two languages examined in this study. This is not unexpected as the Palestinian and Jordanian communities are tightly knit in terms of custom and marriage traditions. Also as expected, KSL and LSL have a lower number of cognates with LIU. This is attributed to the cultural, social, political, and economic circumstances that limit contact between the three nations. Finally, LIU and ABSL share the fewest cognates of all the sign languages studied. This confirms ethnographic reports that the Al-Sayyid Bedouin community is a closed community that has little contact with other Arab communities. Only 24% of their signs were cognates with LIU of total vocabularies compared, similar to that of LSM-NS which shared 23% and was considered by Currie et al. (2002) as a base level of similarity that can be expected between any two unrelated sign languages. This degree of difference falls below the baseline of 26-32% that McKee at al. (2000) give for ASL-NZSL. In fact, LIU-KSL and LIU-LSL (families of a stock) at 40% and 34% cognates are not significantly higher than that base level. This suggests two things: 1) LIU, KSL, and LSL are probably unrelated historically. Following Currie at al. (2002), these numbers indicate a non-historic relationship, 2) possibly sharing similar cultural values predisposes any two Arab sign languages to share some common signs. This is to say, the Arab world shares many emblematic (i.e., symbolic) gestures. It is indeed said that speech, gesture, and culture are so intimately related to Arabs that to tie an Arab's back while they are speaking is tantamount to tying their tongue (Barakat, 1973). It is not unlikely then for deaf Arab communities with little or no contact with each other to still have similar signs due to a shared culture.

Table 2. Basis of difference in signs based on articulation parameters related to LIU from PSL, KSL, LSL, ABSL, and ASL (number of instances)

LIU	Handshape	Location	Movement	Orientation
PSL	7	5	17	9
KSL	8	2	14	9
LSL	20	4	26	5
ABSL	1	0	10	3
ASL	13	11	15	2
Total	49	22	82	28

Note that the LIU-ABSL cognates are at 24%, which is a higher rate than that of 17% shared by LIU and ASL. While these results indicate that ABSL and ASL are unrelated historically to LIU, the higher base level for ABSL than for ASL may be attributed to the fact that LIU and ABSL share the same culture. Common gestures used by hearing people in Arab communities across the Arab world may become appropriated into sign languages so that similarities between Arab sign languages are due to contact with a shared spoken language and gestural environment. It should also be noted that the difference might be due to the discrepancy in vocabularies compared. In the LIU-ASL comparison, more than twice the vocabulary items were available than with LIU-ABSL. Possibly the larger the vocabulary compared, the lower the number of high frequency signs.

We cannot claim that LIU, PSL, and KSL share similar origins have then diverged, but if they did, the parameter that seems most susceptible to change is *movement*. This is unlike the results of the McKee at al. (2000) study, which shows that *handshape* is the primary divergent parameter. It is unclear yet what these results indicate, but they do point to differing patterns of sign language development.

There are several limitations to this study. The vocabulary sets compared are still rather small. However, taken as a whole, the results of this study do paint an interesting picture. Another shortcoming of this study is that dictionaries were mostly used for vocabulary comparisons. As languages are dynamic, it can be surmised that dictionaries cannot accurately capture the vocabulary of a language. That these dictionaries were produced years, and sometimes decades, apart may further obscure the data.

Conclusion

Given the tradition of endogamy in the Arab world, which leads to high rates of genetic deafness, most likely there has been a long history of sign language in the region. As the results of this study show, these sign languages are probably distinct languages, are not dialects, and are unrelated historically. Similarities in their vocabularies may be attributed to sharing similar cultural values; signs may be derived from common symbolic gestures used among hearing people of the region.

This supports the hypothesis that sign languages in the Arab world develop in familial institutions as opposed to educational ones as is the Western pattern. Indeed, organized educational systems in the Arab world are relatively young. With cultural, social, political, and economic circumstances restricting contact between communities, numerous sign languages may develop around family and tribe. Here, the geography of sign languages do not map onto that of the pan-Arab spoken language. The standardization of these languages on a national basis drawing from their schools suggests a creolization or pidgin process, where children from different families and tribes converge and begin to share a common sign language. This presents a unique geography of sign languages unlike the situation in the West. It can, however, be paralleled to Woodward's (1991) findings on sign languages used in Costa Rica, where he found several distinct ones among the numerous indigenous pueblos.

There is at least one implication of these findings in terms of a project to unify sign languages of the Arab world. The underlying assumption that sign languages of the region are similar enough to be

standardized may in fact be wrong. It may be risky to devise a "standardized" sign language in the Arab world, given the difficulty of standardizing languages that are historically unrelated.

Further research could examine gender differences in the region, to investigate whether social and cultural traditions of gender segregation and lack of mobility of women limit the possibility of convergence of languages. This would differ from spoken Arabic where both genders have similar access to the spoken word through media to which deaf people have little to no access. Research may also look into other linguistic features, such as grammar, to investigate further the nature and relationships of sign languages in the Arab world. It may also include other sign languages from the region that have recently documented their language in dictionary form such as Egypt, Lebanon, and Yemen. A most interesting research question yet may be whether two unrelated sign languages have more vocabulary in common than any two unrelated spoken languages. That the base levels of two unrelated sign languages are relatively high indicates that may be the case. It is indeed novel to suggest that there is something inherent in the modality of sign languages that predispose their vocabulary to similarity.

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References

Abdel-Fattah, M. (2005). Arabic sign language: A perspective. *Journal of Deaf Studies and Deaf Education, 10*, 212-221.

Anderson, B. (1983). *Imagined communities: Reflections on the origin and spread of nationalism.* London: Verso.

Barakat, R. (1973). Arabic gestures. *Journal of Popular Culture, 6*, 749-791.

Black, P., & Kruskal, J. (1997). *Comparative lexicostatistics: A brief history and bibliography of key words*. http://www.ntu.edu.au/education/langs/ielex/BIBLIOG.html. Retrieved on August 7, 2006.

Brewer, W. (1951). Patterns of gesture among the Levantine Arabs. *American Anthropologist, 53*, 232-237.

Crowley, T. (1992). *An introduction to historical linguistics.* Oxford: Oxford University Press.

Crowley, T. (1992). *An introduction to historical linguistics.* Oxford: Oxford University Press.

Currie, A., Meier, R., & Walters, K. (2002). A cross-linguistic examination of the lexicons of four signed languages. In R. Meier, K. Cormier and D. Quinto-Pozos (Eds.), *Modality and structure in signed and spoken language*, (pp. 224-236.) Cambridge: Cambridge University Press.

Greenberg, J. (1957). *Essays in linguistics*. Chicago: University of Chicago Press.

Groce, N. (1985). *Everyone here spoke sign language: Hereditary deafness on Martha's Vineyard.* Cambridge, MA: Harvard University Press.

Hamzah, M. (1993). Lughah al-ishara al-Urduniyah al-Arabiyah. Amman, Jordan: Special Audiology Ceneter. Holy Land Institute for the Deaf. (2004). 1964-2004: *The Holy Land Institute for the Deaf-Salt*, Jordan. [Brochure]. Salt, Jordan.

Kisch, S. (2005, December). *Genetic assertions: The case of gender and deafness in a Bedouin community. Genomics and Society: Chances for True Love?* Symposium conducted at the meeting of the

Cooperative Researchers on Society and Genomics, Utrecht, Netherlands. http://www.zw.unimaas.nl/gew/archives/Corsage%20Winter%20Symposium%202005%20Report.pdf (pp. 28-30). Retrieved on October 14, 2006.

Kuwaiti Sign Language Dictionary. (1995*). Kuwaiti Sign Language Dictionary*. http://www.mym.4mg.com/. Retrieved on April 16, 2006.

Lane, H., Hoffmeister, L., & Bahan, B. (1996). *A Journey into the DEAF-WORLD*. San Diego, CA: DawnSignPress.

League of Arab States. (nd). *Member states*. http://www.arableagueonline.org/arableague/english/level2_en.jsp?level_id=11. Retrieved on March 21, 2006.

Mayfield Tomokiyo, L., Black, A. & Lenzo, K. (2003). *Arabic in my hand: Small-footprint synthesis of Egyptian Arabic*, Eurospeech 2003, Geneva, Switzerland. http://www.cs.cmu.edu/~awb/papers/eurospeech2003/arabic/node3.html. Retrieved on January 22, 2007.

McKee, D. & Kennedy, G. (2000). Lexical comparisons of signs from American, Australian, British and New Zealand Sign Languages. In K. Emmorey and H. Lane (Eds.), *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*,(pp. 49-76). Mahwah, NJ: Erlbaum.

Palestine Red Crescent Society. (2000). *Qamus lughat al-ishara al-Falasteeniyah.* Ramallah, Palestine: Matba'et Al-Manar.

Sandler, W., Meir, I., Padden, C., & Aronoff, M. (2005). The emergence of grammar: Systematic structure in a new language. *Proceedings of the National Academy of Sciences of the United States of America, 102,* 9pp. 2661-2665).

Shahin, H., Walsh, T., Sobe, T., Lynch, E., King, M., et al. (February 2002). Genetics of congenital deafness in the Palestinian population: Multiple connexin 26 alleles with shared origins in the Middle East. *Human Genetics, 110,* 284-289.

Suleiman, Y. (2003). *The Arabic language and national identity.* Edinburgh University Press.

Suwayd, A. (1992). *Al-qamus al-ishari*. Triploi, Libya: Dar Al-Madinah Al-Kadeemah Lil-kitab.

Tennant, R., & Gluszak Brown, M. (1998). *The American Sign Language handshape dictionary.* Washington, DC: Gallaudet University Press.

Walsh, T., Abu Rayan, A., Abu Sa'ed, J., Shahin, H., Shepshelovich, J., et al. (2006). Genomic analysis of a heterogeneous Mendelian phenotype: Multiple novel alleles for inherited hearing loss in the Palestinian population. *Human Genome, 2,* 203-211.

Woodward, J. (1978). Historical bases of American Sign Language. In P. Siple (Ed*.), Understanding language through sign language research,* (pp. 333-348). New York: Academic Press.

Woodward, J. (1991). Sign language varieties in Costa Rica. *Sign Language Studies, 73,* 329-346.

Woodward, J. (1993). The relationship of sign language varieties in India, Pakistan, and Nepal. *Sign Language Studies, 78,* 15-22.

Woodward, J. (1996). Modern Standard Thai Sign Language: Influence from American Sign Language and its relationship to original Thai Sign Language varieties. *Sign Language Studies, 92,* 227-252.

Zeshan, U. & AYJNIHH. (forthcoming). *Professional interpreter course in Indian Sign Language (Level C).* Mumbai: Ali Yavar Jung National Institute for the Hearing Handicapped.