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The digital language research landscape in multilingual Switzerland

Abstract

This national report briefly discusses the current state of digital technology in language research in the Swiss context. Switzerland is known for its institutionalized multilingualism and characterized by a relatively decentralized political and administrative structure. The report presents some recent research projects in the broader field of language technology that reflect this regional and linguistic diversity and lays out current developments in digital research infrastructure that point towards increased inter-institutional cooperation and centralization. I also identify institutional key players such as regional and national research associations and institutes.

1.   Introduction

Switzerland is a multilingual state with four distinct national languages and many officially bilingual or trilingual regions; its confederal political system accords relatively great weight to actors at the cantonal or communal level. Accordingly, the country has no national language institute in the sense that many other European nations do. Although established at national level on the basis of a federal law, the Swiss Research Centre on Multilingualism (RCM) depends on institutional partnerships with two universities in a bilingual canton, and it has a network of external partners from other higher education institutions in Switzerland. Its projects are often conducted in the form of partnerships, or financed by the RCM and then carried out directly by researchers at other institutions.

When trying to identify recent trends in Swiss digital language research, it should be useful to take a broad approach that is informed by both the institutional realities and the complexities of the country's linguistic and political landscape. In my effort to provide an overview of this diverse and regionally differentiated landscape, I will therefore look beyond national institutions and at interregional networks. I will first identify key institutional players both at national and regional levels. Along the way, I will present some research projects carried out by these institutions that deal with questions of digitalization and language, or that apply new forms of language technology, and that in many cases reflect the particularities of Switzerland as a multilingual nation. Finally, I will sketch out some recent developments in Switzerland's digital research infrastructure as it relates to linguistics and analyse tendencies toward stronger integration at national and supranational levels.

Language technology and digital research in linguistics are important and fast-moving fields, and any attempt at providing an overview will necessarily risk being incomplete and outdated even a few months after publication. Nevertheless, it is my hope that providing a snapshot impression of this research landscape as it exists in early 2022 will prove to be useful both for general orientation purposes and as a way to document the state of the field.

2.   National and regional research institutions

Tasked by the Swiss Federation to "coordinate, introduce and conduct applied research on languages and plurilingualism",[1] the Research Centre on Multilingualism investigates various aspects of languages in the Swiss context. Sociolinguistic research by the RCM examines "how multilingualism in institutions and society impacts the political sphere, the economy and (public) administration".[2] An especially prominent part of the RCM's research deals with questions of language acquisition, the evaluation of multilingual competences, and language learning and teaching in multilingual settings. Digital language technology plays an increasingly important role in this context, as evidenced, for example, by the debate on distance learning that has acquired a particular urgency due to the recent COVID-19 pandemic. The RCM's most recent research programme, running from 2021 to 2024 and developed after consultations with the Swiss Federal Office of Culture, reflects this current shift towards digitalization.[3] Among the ten new research projects, several deal either directly or indirectly with questions raised by the pandemic. *Multilingualism in a health crisis*, for example, takes a sociolinguistic perspective on challenges in communicating COVID-19-related information, "be it information about the current situation, health issues and distancing rules, or to explain work-related rights and obligations, access to emergency financial aid, and even educational matters". The project examines channels of multilingual communication by governmental, institutional, and private organizations, such as websites, and analyses to what extent they took the needs of language minorities into account, including both speakers of official languages and residents who speak none of these languages nor English. The results should help Switzerland "to optimise the ways in which the tools of crisis management reflect the ideals of social inclusion and language sensitivity". Other projects are in the areas of

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[1]   Cited from the official English translation of article 18 of the Federal Act on the National Languages and Understanding between the Linguistic Communities (LangA), which was passed by the Federal Assembly on October 5, 2007 and last revised in February 2021. https://www.fedlex.admin.ch/eli/cc/2009/821/en (last access: 18-02-2022).

[2]   https://centre-plurilinguisme.ch/en/about-us (last access: 18-02-2022).

[3]   Cf. https://institut-plurilinguisme.ch/en/research for more detailed information about the RCM's current projects. The following citations are taken from project descriptions on the website (last access: 04-03-2022).

Computer Assisted Language Learning (CALL) and Mobile Assisted Language Learning (MALL). *Digital technology and vocabulary learning in vocational education* examines how digital learning environments can be used to support vocabulary training in schools for business, management, and services that require students to learn a national language and English. The subproject *Digital translation tools in foreign language teaching and learning*, meanwhile, looks at how tools like DeepL or Google Translate can be made useful for language teaching. The *Swiss Learner Corpus* (SWIKO), an ongoing long-term umbrella project first launched in 2016, collects text productions from foreign language learners all over Switzerland, with a view to identifying how such a corpus can be made useful in foreign language teaching and multilingual education. In the RCM's current research programme, two new subprojects will expand the scope of the database and explore further applications of corpus data in language education, adding, for instance, authentic spoken language recordings and producing teaching material from these data. The corpus, which is already being used in teaching and research at Fribourg University, will be made accessible to a wider range of external researchers. The RCM also operates the Web Portal on Multilingualism, one of the most comprehensive electronic resources for research on languages in Switzerland.[4]

As mentioned at the outset, the RCM, with its numerous partnerships with institutions of higher education, is just one element in the mosaic of Switzerland's linguistic research system. Most Swiss research on languages is conducted at the country's twelve full universities. There are also many universities of applied sciences or institutes of teacher education that conduct research on language policy and language teaching. It is therefore not possible to provide a complete overview here; instead, a few institutions and some research projects conducted by them over the past ten to fifteen years will be highlighted as examples to illustrate the range of Swiss digital research on languages and linguistics.

The University of Zurich, the largest institution of higher education in Switzerland with approximately 28,000 students, has been conducting strong research in this area for some time. Researchers at its Department of Computational Linguistics publish on a wide range of topics, such as computational text or speech processing, forensic phonetics, experimentational computer linguistics, and computational neuroscience. Many of the research projects conducted or supported by the Department apply modern language technology to the Swiss context and focus on either the country's multilingual nature or the diglossic situation in German-speaking Switzerland, i.e. the parallel use of Standard German and a variety of Swiss German dialect.[5] Various corpus linguistic projects from the last two

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[4]   https://centre-plurilinguisme.ch/en/centre-de-documentation#anchor13 (last access: 09-03-2022).

[5]   See Studler (2012) for an examination of diglossia in German-speaking Switzerland.

decades may be cited as illustrations: *NOAH's corpus* from 2018, for instance, examines texts written in Swiss German and provides POS tagging for this language. It applies natural language processing techniques to Swiss German dialects, which are usually associated with spoken language and for which there are no standard spelling rules, a fact that made this project particularly challenging.[6] Other corpus linguistics projects made use of Switzerland's tradition of multilingual publishing to create parallel corpora. The *Text+Berg*, or 'Text & Mountain,' digital project (2008-) covers two publication series by the Swiss Alpine Club. These series have been published continuously in French, Italian, and German since 1864. They are being digitally recorded and corpus-linguistically processed. As the project description notes,

> The computational linguistic interest in the corpus lies on the one hand in the preparation of the corpus itself (automatic word type recognition, proper names/place name recognition etc.), but also in the analysis of the linguistic data, for example to refine language models. Since the publications contain not only German, but also French and Italian texts, it makes sense to create a "comparable corpus" for multilingual questions.[7]

Similar parallel corpora created by the Department include a corpus compiled from the archives of the bulletin of the Swiss bank Crédit Suisse.[8] This magazine has been published in several languages, not just in the national languages of German, French, and Italian, but also in English and even Spanish. As with *Text+Berg*, the *Credit Suisse Bulletin Corpus* is of interest to researchers working at the interface of the digital humanities and contrastive linguistics, all the while offering a potential for researchers working with sociolinguistic approaches to discourse analysis.

    The University of Zurich's Department of Computational Linguistics is but one notable Swiss institution of higher education working on such topics. The *Swiss SMS Corpus* project, compiled between 2009 and 2010 by the Department of Romance Linguistics at the same University, consists of close to 26,000 mobile text messages which were sent in by the Swiss public: 41% of the messages are in the Swiss German dialect, 28% in non-dialectal German, 18% in French, 6% in Italian, and 4% in Romansh.[9] Other noteworthy research departments in this context include the ILC Institute of Language Competence at Zurich's ZHAW School of Applied Linguistics, whose research focuses on areas such as digital linguistics and human-machine communication.[10] ZHAW's School of Engineer-

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[6]   https://noe-eva.github.io/NOAH-Corpus/ (last access: 09-03-2022).

[7]   https://textberg.ch/ (last access: 09-03-2022).

[8]   https://pub.cl.uzh.ch/projects/b4c/ (last access: 09-03-2022).

[9]   https://sms.linguistik.uzh.ch/ (last access: 09-03-2022); cf. Dürscheid/Stark (2011). A more recent project in the same vein examines WhatsApp messages (Ueberwasser/Stark 2017).

[10] https://www.zhaw.ch/de/linguistik/institute-zentren/ilc/ [last access: 09-03-2022].

ing Centre for Artificial Intelligence works on the natural language processing of Swiss German dialects[11] while its Digital Discourse Lab has published *The Swiss Corpus for Applied Linguistics* (Swiss-AL)*,* a "linguistically processed, multilingual collection of texts from key stakeholders in the field of Swiss public communication".[12] Interdisciplinary centres and groups at other universities pursue similar research interests. The University of Neuchâtel's Centre de Linguistique de Corpus (CLC) may be cited as one example.[13] OFROM (*le corpus Oral de Français de Suisse Romande*), the first spoken language corpus that consists exclusively of speech from French-speaking Switzerland, illustrates the university's activities in this field.[14] The University of Geneva's Computational Learning and Computational Linguistics research group, meanwhile, "is concerned with interdisciplinary research combining linguistic modelling with machine learning techniques",[15] while the University of Basel's Digital Humanities Lab boasts a "fast growing research agenda in digital editions, digital photography, computational linguistics and literary studies, digital reading studies and digital infrastructures".[16]

It is perhaps no coincidence that Swiss university departments frequently address the country's multilingual nature in their language related research. For speakers of Switzerland's official minority languages, digital research is not only a way of exploring the linguistic, social, and psychological dynamics of multilingual exchange but can also be a way to preserve their language and their cultural heritage. About 0.5% of the Swiss population speaks Romansh as their main language, with decreasing numbers observed from 1970 to 2020.[17] Applied research projects such as *Translaturia* (University of Applied Sciences of the Grisons) are attempting to counter the language's lack of a media presence and give it greater visibility. The project seeks to create a translation tool and develop recommendations to help companies with translation activities to better digitalize and partially automate their existing processes when using Romansh.[18] *Capeschas*, developed by the University of Teacher Education of Grisons in collaboration with the RCM, is an interactive online tool that helps with the acquisition of receptive Romansh

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[11] https://www.zhaw.ch/en/research/research-database/project-detailview/projektid/5059/ (last access: 09-03-2022).

[12] https://www.zhaw.ch/en/linguistics/research/swiss-al/ [last access: 09-03-2022).

[13] http://www.unine.ch/clc (last access: 09-03-2022).

[14] http://www11.unine.ch/ (last access: 09-03-2022).

[15] https://clcl.unige.ch/ (last access: 09-03-2022).

[16] https://dhlab.philhist.unibas.ch/en/ (last access: 09-03-2022). Situated at the crossroads of digital linguistics and the liberal arts, the digital humanities have become a recent focus of interest at many other Swiss universities, including the University of Bern and Lausanne's EPFL.

[17] See the Federal Statistical Office's website: https://www.bfs.admin.ch/bfs/en/home/statistics/population/languages-religions/languages.html (last access: 11-03-2022).

[18] https://translaturia.fhgr.ch/ (last access: 11-03-2022).

skills.[19] Other projects are situated in the field of digital philology. The *Dicziunari Rumantsch Grischun* makes the vocabulary of the Romansh language accessible and has been making various digital contents available online since 2007.[20] The digital Rhaeto-Romanic Chrestomathy developed by researchers at the University of Cologne, Germany, is also worth mentioning in this context.[21]

Research is also being carried out at establishments that are attached to universities but function on an inter-institutional basis and frequently take on outside funding. In French-speaking Martigny, for instance, the federally funded EPFL University and the University of Geneva co-finance the Idiap Research Institute[22] – a non-profit research foundation that also receives funding from the local and cantonal authorities as well as from Swisscom, the country's largest telecom company. This is worth mentioning because there are generally few well known or successful commercial companies in Switzerland that deal with language technology in the commercial sector. While the country does have a start-up culture, there are, as of yet, relatively few companies that stand out in fields such as machine translation or language processing (Rehm/Uszkoreit 2012, 31). However, as the example of the Idiap Research Institute shows, technology transfer is still significant in the context of Swiss research institutions. While Idiap conducts basic and applied research in all fields related to artificial intelligence, an important part of its activities concerns linguistics and language technology: the Institute has research groups dedicated to language and cognition, natural language understanding, signal processing for communication, and speech and audio processing.

3.   Switzerland's digital research infrastructure

Taking a step back from individual institutional actors and individual research projects, we can see that the digital infrastructure that supports linguistic research in Switzerland has been developing at a fast pace in recent years. As research activities are largely devolved to cantonal level with organizational and financial support from national academic associations,[23] this development has not seen much direct input from the federal administration. In Switzerland's federal digitaliza-

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[19] http://chapeschas.ch/app.php (last access: 11-03-2022).

[20] https://www.drg.ch/ (last access: 11-03-2022).

[21] http://www.crestomazia.ch/ (last access: 11-03-2022). See also Neuefeind/Rolshoven/Steeg (2011).

[22] https://www.idiap.ch/en (last access: 16-03-2022).

[23] See, for instance, the significant P-5 funding programme set up by the Swiss Universities Rectors' Conference, which aims at "improving the supply of digital scientific content and creating optimised tools for processing it": https://www.swissuniversities.ch/en/topics/digitalisation/p-5-scientific-information (last access: 16-03-2022).

tion strategy, language(s) and language technology are not mentioned directly.[24] Nevertheless, the general trend is towards a greater centralization of platforms and services at national level, but in a way that takes the linguistic diversity of the country and its regional sensibilities into account. Three examples may serve to illustrate this trend.

The first example is the SLSP – the Swiss Library Service Platform (cf. Marty/ Küssow 2021). Originally founded in 2015 by 15 academic institutions, the network now gathers scientific information from 475 libraries throughout Switzerland. The country used to have separate library service networks for each of its language regions. Earlier attempts to build an integrated national union catalogue were unsuccessful. The SLSP finally succeeded in establishing such a catalogue with Swisscovery, which launched in late 2020.[25] Swisscovery offers a multilingual interface in French, German, Italian, and English. The SLSP is also a consortium that acquires licences for databases and other electronic resources for university libraries. The underlying library network allows affordable interlibrary loans between the country's four language regions.

Questions of archiving and managing research data have also become of increasing relevance to Swiss language research. As Switzerland transitions to the Open Data paradigm and tries to make as many of its research data publicly available according to the FAIR principles, new technologies and platforms are emerging.[26] At the universities of Geneva and Fribourg, OLOS[27] is already in use, a transdisciplinary platform developed by the Data Life-Cycle Management (DLCM) project (cf. Burgi/Makhlouf Shabou 2021). There are also more specialized platforms of interest to linguists and language researchers, such as DaSCH (Data and Service Center for the Humanities),[28] or several solutions proposed by SwissUBase.[29] SwissUBase already serves as the basis for FORSbase, a new version of the FORS database already in use for some years among social scientists.[30] A solution specifically aimed at language researchers is currently under develop-

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[24] https://www.digitaldialog.swiss/en/actionplan (last access: 16-03-2022). The Swiss Academy of Engineering Sciences' 2019 report on artificial intelligence technology mentions the potential of language technology for the sciences (Schweizerische Akademie der Technischen Wissenschaften 2019, 2).

[25] https://swisscovery.slsp.ch/ (last access: 16-03-2022).

[26] For some general impressions of recent developments, see Burgi/Echernier (2020), or the website of the swissuniversities Open Science programme: https://www.swissuniversities.ch/ en/topics/digitalisation/open-science-2021-2024 (last access: 16-03-2022).

[27] https://olos.swiss/ (last access: 16-03-2022).

[28] https://www.dasch.swiss/ (last access: 16-03-2022).

[29] https://www.swissubase.ch/en/ (last access: 16-03-2022).

[30] https://forsbase.unil.ch/ (last access: 16-03-2022).

ment.[31] All these platforms are offered at national level and will likely soon replace regional or institutional repositories for research data that have already existed for some time, such as local solutions employed by the Research Centre on Multilingualism.

As a third, recent example, we can cite LiRI, standing for Linguistic Research Infrastructure. The LiRI laboratory at the University of Zurich was formally inaugurated in autumn 2021. LiRI is a project that has been in development since 2017 and aims to enable "internationally significant research in linguistics, putting Switzerland at the forefront of experimental and Big Data based research".[32] LiRI essentially consists of two services aimed at facilitating experimental and data-based language research: the first is a physical laboratory with state-of-the-art language technology used in psycholinguistic and neurolinguistics research that ranges from eye-tracking devices to machines measuring the auditory brainstem response. Additionally, LiRI offers data services such as the creation of databases to store and search data collections, or access to highly specialized software for linguistic data transcription or annotation. Against payment of a fee, these services are available to all researchers in Switzerland. *Swissdox@LiRI* is a service of particular interest to researchers working on automated approaches to mass media discourse analysis. As of early 2022, "[t]he database includes about 29 million media articles (press, online) from a wide range of Swiss media sources covering many decades, and is updated daily with about 5,000 to 6,000 new articles from the German and French speaking parts of Switzerland".[33] While additional media sources from the Italian and Romansh speaking regions of the country would undoubtedly be a highly welcome addition to Swissdox, it should be noted that the project is already continuously being expanded with improvements to the interface and data enrichment features such as POS tagging. Visualization functions, which are becoming an increasingly important tool for analysing text corpora (cf. Bubenhofer et al. 2019), will also be implemented at some point.

As all three examples show, there is an increasing tendency towards national integration in Swiss research infrastructure. This tendency is typically being supported by select university-based institutional actors, while being financed through a combination of initial federal funding and support from consortial networks that are grounded in the scientific community and receive long-term funding from various cantonal universities. Even though individual research institutions remain linguistically diverse and geographically dispersed, there is now an increasing number of offers available at national level, aimed at Swiss researchers from all parts of the country and all language regions.

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[31]   https://www.ub.uzh.ch/de/wissenschaftlich-arbeiten/mit-daten-arbeiten/swissubase.html (last access: 16-03-2022).

[32]   https://www.liri.uzh.ch/ (last access: 16-03-2022).

[33]   https://www.liri.uzh.ch/en/services/swissdox.html (last access: 16-03-2022).

4.   From national to international integration

This tendency towards greater integration on a national level goes hand in hand with ongoing efforts to connect the Swiss research community with its European and international counterparts. Long-standing political frictions concerning the general framework for cooperation between the EU and Switzerland have led to disruptions in this area in recent years; as of 2022, Switzerland has been reduced to the status of a non-associated third country in the EU Framework Programme for Research and Innovation *Horizon Europe* and other related initiatives.[34] Nevertheless, Swiss institutions in the domain of language research have recently made some progress in connecting with their European partners.

Joining CLARIN (Common Language Resources and Technology Infrastructure), the principal European research infrastructure project in digital linguistics, has long been outside the scope of Swiss linguistics programmes.[35] In December 2020, CLARIN-CH was founded as the Swiss node of CLARIN Europe. Among its founding members are the universities of Bern, Lausanne, Lugano, Neuchâtel, and Zurich, as well as the University of Applied Sciences Zurich, and the Swiss Academy for the Humanities and Social Sciences (SAGW).[36] CLARIN-CH is now recruiting additional interested parties, touting benefits such as "[i]ncreased international visibility for Swiss corpus-based projects, corpora and linguistic databases, tools and infrastructure" or access to European infrastructure programs, services, and funding opportunities.[37] Among the association's dissemination efforts is a 'Tour de Suisse' with information sessions at all research and academic institutions throughout the country that are interested in gaining access to CLARIN resources and infrastructure. The national and scientific coordination of the CLARIN-CH network is being assumed by Zurich-based researchers, and CLARIN-CH coordinates with the above-mentioned LiRI project, which is also based at the University of Zurich. The network describes its principal mission as follows:

1) Obtain Switzerland's CLARIN membership and give Swiss researchers access to the entire CLARIN infrastructure.
2) Bring together the Swiss community using language resources and create national working groups.
3) Foster the sharing of expertise and of resources.
4) Encourage the initiation of national and international collaborations.[38]

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[34] Cf. the Confederation's official website on this matter: https://www.horizon-europe.ch (last access: 21-03-2022).

[35] Cf. Eskevich et al. (2020) for an introduction to CLARIN and the official website for up-to-date information: https://www.clarin.eu (last access: 21-03-2022).

[36] https://clarin-ch.linguistik.uzh.ch/ (last access: 21-03-2022).

[37] https://clarin-ch.linguistik.uzh.ch/_media/poster_clarin-ch_september10.pdf (last access: 21-03-2022).

[38] https://clarin-ch.linguistik.uzh.ch/_media/vals-asla_forum_clarin-ch_february2022.pdf (last access: 21-03-2022).

In pursuit of this mission, CLARIN-CH is preparing an application for observer status at CLARIN-EU.

A similar status has already been achieved by the Swiss consortium for DARIAH, the Digital Research Infrastructure for the Arts and Humanities. Established in 2014 as a European Research Infrastructure Consortium, DARIAH-EU describes itself as "a network of people, expertise, information, knowledge, content, methods, tools and technologies from its member countries" that "aims to enhance and support digitally-enabled research and teaching across the arts and humanities".[39] Its Swiss partner DARIAH-CH was founded in 2018.[40] Coordinated by the Basel-based DaSCH (see above) and with significant initial support from researchers at the University of Neuchâtel, DARIAH-CH aims to connect Swiss institutions with European digitally-enabled research in the arts and humanities or the teaching of digital research methods. Among its members are the Swiss Academy of Humanities and Social Sciences and the universities of Basel, Bern, Geneva, Lausanne, Neuchâtel, and Zurich, as well as Lausanne's EPFL. While DARIAH-CH is less directly invested in linguistic research in the narrow sense of the term than CLARIN-CH, the network's activities in the areas of Open Linked Data or digital text analysis and curation should be of interest to Swiss researchers active in digital linguistics and adjacent fields.

5.   Conclusion

Switzerland has a diverse and regionally differentiated research landscape in the field of linguistics, language teaching, and language planning. While some of the institutions introduced in this paper stand out in terms of their research output and the resources they dispose of, this generally also holds true for digital linguistics. The research projects I have briefly presented here do not just reflect this institutional diversity but also the ongoing necessity to consider the country's linguistic diversity as well as the perspectives and needs of its language minorities. They also demonstrate that the generally popular notion of 'multilingualism as a resource', which has occasionally invited criticism (cf. Duchêne 2011), holds some weight in Switzerland — at least when it comes to acquiring and exploiting material and sources for linguistic research.

The general tendency towards greater national and international integration noted in this paper will likely increase in the years to come. This integration process is supported from within the scientific community and driven by cooperative efforts between actors at regional and national levels. We could, however, also think of it as almost a function of the global nature of the digitalization process

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[39]   https://www.dariah.eu/about/dariah-in-nutshell/ (last access: 21-03-2022).

[40]   https://dariah.ch/ (last access: 21-03-2022).

per se, which both encourages and enables processes of organizational centralization and standardization. It remains to be seen how these developments will co-exist with the confederate system and the multilingual reality in Switzerland.

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