

L'ANALISI
LINGUISTICA E LETTERARIA

FACOLTÀ DI SCIENZE LINGUISTICHE E LETTERATURE STRANIERE
UNIVERSITÀ CATTOLICA DEL SACRO CUORE

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SUPPLEMENTO

*Critical Issues in English –
Medium Instruction at University*

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Edited by Jennifer Valcke, Amanda C. Murphy, Francesca Costa

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Facoltà di Scienze Linguistiche e Letterature straniere
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STUDENTS' OUTCOMES IN ENGLISH-MEDIUM INSTRUCTION: IS THERE ANY DIFFERENCE RELATED TO DISCIPLINE?

FRANCESCA COSTA, CRISTINA MARIOTTI¹

This paper focuses on the acquisition of content in Economics and Science EMI classes taught by the same lecturers. The control group consists of L1-taught classes (Italian), whereas the experimental group consists of L2-taught classes (English). Students' marks in two comparable written exams are analysed. Data are complemented with interviews with the lecturers. The results show that in some instances the two groups differ significantly as regards the acquisition of content.

Keywords: ICLHE, content acquisition, content presentation, English-medium instruction, Italian-medium instruction

Introduction

Since the beginning of the Bologna Process in 1999, Italy has seen a fast-paced and steady rise of internationalisation programmes, which in practice have translated into the fact that an increasingly high number of university courses have been taught in English over the past decade (Dearden 2014)². At the tertiary level, English-taught programmes and courses are generally part of a top-down strategy imposed by the institutions³, and their spread has been accompanied both by positive factors, such as an increase in student mobility, and by concerns regarding on the one hand the loss of domain of Italian in favour of English as the language of academia, and on the other the possibility that content learning is affected in a negative way by a change in the language of instruction. In other words, it is being questioned whether learning in a foreign language at the tertiary level affects the quality and quantity of subject matter content acquired if compared to teaching the same content in the students' L1. This issue should be addressed especially at the tertiary level, where academic content cannot be simplified if delivered in an additional language, and where, at

¹ Paragraphs 2, 5, and 6 were written by Francesca Costa; paragraphs 1, 3, 3.1, 3.2, and 4 were written by Cristina Mariotti.

² J. Dearden, *English as a medium of instruction – a growing global phenomenon*, 2014, https://www.britishcouncil.org/sites/default/files/e484_emi_-_cover_option_3_final_web.pdf (last accessed September 28, 2017).

³ F. Costa – J. Coleman, *A Survey of English-Medium Instruction in Italian Higher Education*, "International Journal of Bilingual Education and Bilingualism", 15, 2012, 4, pp. 1-17.

the same time lecturers might simplify their input because they feel their ability to convey subject matter contents effectively is limited by the use of an L2⁴.

This study presents the results of a follow-up study to Costa and Mariotti (2017)⁵ and investigates content acquisition in English-Medium Instruction (EMI) versus Italian-Medium Instruction (IMI) settings in four different universities in Northern Italy. The objective of this study is to find out whether one of the two teaching modes leads to better learning outcomes in terms of exam marks, and whether the learning outcomes are affected by either the type of subject or the degree course level (Bachelor of Arts, BA – or Master of Arts, MA). The choice of Italy is particularly relevant because despite the fact that EMI courses have continued to spread at an increasingly fast pace over the past two decades (Maiworm and Wächter 2014)⁶, the academic community has not yet reached an agreement on whether teaching in English is detrimental to the learning of content acquisition (Maraschio and De Martino 2013)⁷, and only one study (Costa-Mariotti 2017⁸) comparing the learning outcomes of students attending courses in their L1 versus students attending same content courses taught in English has been carried out so far.

2. Literature Review

Part of the debate on the benefits of EMI revolves around the fact that it has yet to be proven whether or not learning a subject-matter through a foreign language impedes the learning of content. For this reason, many academics hold that research in this area is necessary in order to have as much empirical data as possible on this situation (Ruiz de Zarobe 2010, Dalton-Puffer, 2011; Perez Cañado, 2011; Doiz, Lasagabaster and Sierra, 2013)⁹. There have been few studies in this area, since at the methodological level it is difficult to plan scientifically sound research in an educational context, with both experimental (EMI)

⁴ F. Costa – C. Mariotti, *Differences In Content Presentation and Learning Outcomes In English Medium Instruction (EMI) Vs Italian-Medium Instruction (IMI) Contexts*, in *Integrating Content and Language in Higher Education: Perspectives on Professional Practice*, J. Valcke – R. Wilkinson R. ed., Peter Lang, Frankfurt 2017, pp. 187-204.

⁵ *Ibidem*.

⁶ B. Wächter – F. Maiworm, *English-Taught Programmes in European Higher Education. The State of Play in 2014*, Lemmens, Bonn 2014.

⁷ N. Maraschio – D. De Martino, *Fuori l'italiano dall'università? Inglese, internazionalizzazione, politica linguistica*, Laterza, Roma/Bari 2013.

⁸ F. Costa – C. Mariotti, *Differences In Content Presentation and Learning Outcomes In English Medium Instruction (EMI) Vs Italian-Medium Instruction (IMI) Contexts*.

⁹ Y. Ruiz de Zarobe, *Written production and CLIL: An empirical study*, in *Language use and language learning in CLIL classrooms*; C. Dalton-Puffer – T. Nikula – U. Smit ed., John Benjamins, Amsterdam, the Netherlands 2010, pp. 191–212; C. Dalton-Puffer, *Content and Language Integrated Learning for Practice to Principles?*, “Annual Review of Applied Linguistics”, 31, 2011, pp. 184-204; M.L. Pérez-Cañado, *CLIL Research in Europe: Past, Present and Future*, “International Journal of Bilingual Education and Bilingualism”, 15, 2012, 3, pp. 315-341; A. Doiz – D. Lasagabaster – J.M. Sierra, *Future Challenges for English-medium Instruction at the Tertiary Level*, in *English-medium Instruction at Universities*, A. Doiz – D. Lasagabaster – J.M. Sierra ed., Multilingual Matters, 2013, pp. 213-221.

and control (IMI) groups. Therefore, the present review will consider only studies that have used statistics to compare marks; studies on stakeholders' perceptions of the results regarding content acquisition will not be considered.

Studies focused on outcomes in terms of content acquisition in primary schools have been undertaken in Belgium (Van de Craen, Ceuleers and Mondt, 2007)¹⁰, where children exposed to bilingual education outperform their counterparts in mathematics; in Spain (Ramos García, Ortega Martín and Madrid 2011)¹¹, where a comparison made to establish whether or not bilingualism was detrimental to the learning of content and found no evidence of this; and in Switzerland (Serra, 2007)¹², where CLIL¹³ classes were as good as, and sometimes better than, control classes where mathematics was taught in the mother tongue. One of the most recent studies (Fernández-Sanjurjo, Fernández-Costales and Arias Blanco, 2017)¹⁴ has been carried out again in Spain in the region of Asturias. The sample of students (CLIL and non-CLIL) was very big (709). The acquisition of content was tested by means of a standardised test (carried out in Spanish for both groups) for the discipline of science. In this case, results show that non-CLIL students slightly outperform CLIL students in science.

As far as Italy is concerned, there has been just one study of this kind and it concerned primary schools (Infante 2009)¹⁵. This study reports an ad hoc analysis of 298 students (control and experimental classes) for art, science, history and technology classes, finding no significant differences in the performance scores for subject-matter content. Obviously, primary school studies deal with a broader range of subject areas due to the type of interdisciplinary teaching involved. The situation is quite different with disciplinary learning at universities, where the subjects are highly specialized.

Two studies have been carried out in secondary schools: one in the Netherlands (Admiraal, Westhof and de Bot, 2006)¹⁶, where the results showed that the experimental

¹⁰ P. van de Craen – E. Ceuleers – K. Mondt, *Cognitive Development and Bilingualism in Primary Schools: Teaching Maths in a CLIL Environment*, in *Diverse Contexts – Converging Goals: CLIL in Europe*, D. Marsh – D. Wolff ed., Peter Lang, Frankfurt 2007, pp. 185-200.

¹¹ A.M. Ramos Garcia – J.L. Ortega Martín – D. Madrid, *Bilingualism and Competence in the Mother Tongue*, in *Studies in Bilingual Education*, D. Madrid – S. Hughes ed., Peter Lang, Frankfurt 2011, pp. 135-156.

¹² C. Serra, *Assessing CLIL at Primary School: a Longitudinal Study*, "The International Journal of Bilingual Education and Bilingualism", 10, 5, 2007, pp. 582-602.

¹³ CLIL stands for Content and Language Integrated Learning and implies an integration between content and language. It is normally used for primary and secondary contexts, but it is increasingly being used also at the tertiary level. EMI stands for English-medium Instruction and is widely used in higher education where it does not necessarily imply attention to language.

¹⁴ J. Fernández-Sanjurjo – A. Fernández-Costales – J.M. Arias Blanco, *Analysing Students' Content-Learning in Science in CLIL vs non-CLIL Programmes: Empirical Evidence from Spain*, "International Journal of Bilingual Education and Bilingualism", 2017, <http://dx.doi.org/10.1080/13670050.2017.1294142> last accessed September 28, 2017.

¹⁵ D. Infante, *Il Content and Language Integrated Learning (CLIL) in Italia, Modelli didattici e sperimentazioni nella scuola primaria*, Editrice Nuova Cultura, Roma 2010.

¹⁶ W. Admiraal – G. Westhoff, – K. de Bot, *Evaluation of Bilingual Secondary Education in the Netherlands: Students' Language Proficiency in English*, "Educational Research and Evaluation", 12, 2006, pp. 75–93.

group (CLIL-like) achieved significantly higher results than the control group, and one in Finland (Jäppinen, 2005)¹⁷ involving 669 students from 7 to 15 years of age, where no negative results were found regarding cognitive development in maths and science for the CLIL group.

The only studies (three) comparing EMI classes with those taught in the language of the country in which the university is found were done in Spain and Italy, all of which involved economics. Dafouz, Camacho, and Urquia (2014)¹⁸ compared BA students in Business Administration for Accounting, Finance and History classes, carrying out a t-test to compare the class marks where these subjects were taught in Spanish against those in which EMI was adopted (316 students were examined). Different professors were involved in the two strands (the one taught in Spanish and the one taught in English). The study revealed that English was not a detriment to content learning. Hernandez-Nanclares and Jimenez-Muñoz (2015)¹⁹ came to the same conclusions and compared the average marks of students (654 in all) doing a BA in Economics; in this case as well, there were different lecturers for the two strands. However, it was not possible to do a t-test but only a comparison of the averages.

In Italy, on the other hand, there has been only one study, by Costa and Mariotti (2017)²⁰, involving two cohorts of students (214 in number) studying Economics, with an experimental EMI group and a control group. The final exam on which the marks were based for the comparison was identical for both the EMI and IMI groups, and both groups had the same lecturer. In this case, the results also revealed no significant differences in the t-tests between the two groups, and thus no difference in learning when the final exam marks of the groups were compared.

3. Methodology

The present paper tries to answer the following research questions: Does one of the two teaching modes, i.e. IMI vs EMI, lead to better learning outcomes based on exam marks? Are learning outcomes affected by either the type of subject or the degree course level (BA/MA) in the two settings? In the present study differences in content acquisition in IMI and EMI were analyzed by comparing the marks obtained by students on their final exam, all consisting in multiple-choice written tests. The factors leading to the choice of

¹⁷ A.K. Jäppinen, *Thinking and Content Learning of Mathematics and Science as Cognitive Development in Content and Language Integrated Learning (CLIL): Teaching Through a Foreign Language in Finland*, "Language and Education", 19, 2005, pp. 148–169.

¹⁸ E. Dafouz – M. Camacho – E. Urquia, 'Surely they can't do as well': *A comparison of business students' academic performance in English-medium and Spanish-as-first-language medium programmes*. "Language and Education", 28, 2014, 3, pp. 223-236.

¹⁹ N. Hernandez-Nanclaresa – A. Jimenez-Munoz, *English as a medium of instruction: Evidence for language and content targets in bilingual education in economics*, "International Journal of Bilingual Education and Bilingualism", 2015, pp. 1-14. DOI:10.1080/13670050.2015.1125847 last accessed September 28, 2017.

²⁰ F. Costa – C. Mariotti, *Differences In Content Presentation and Learning Outcomes In English Medium Instruction (EMI) Vs Italian-Medium Instruction (IMI) Contexts...*

the sample were the following: the lecturer had to teach the same content in two courses, one held in Italian (IMI) and the other in English (EMI), in order to maximize group comparability. A request to participate was sent to 14 lecturers from Departments where English was used as a medium of instruction, and only four of them accepted. The present study represents the continuation of a pilot study on the first two cohorts (Costa and Mariotti 2017)²¹. To complete the study, interviews were conducted with the lecturers to determine whether there was any bias on their part toward the two groups and if the two groups were comparable. The study considered two science and two economics subjects.

3.1 *Sample*

The sample included 18 students studying International Relations (Master's level, public university) in the EMI strand and 18 in the IMI one. There were 111 students studying Economics (Master's level, private university) in the EMI group and 65 in the IMI one. Forty-four geometry students (Master's level, private university) were surveyed for the EMI group and 50 for the IMI one, while the respective numbers for physiopathology (Bachelor's level, public university) were 79 and 187. In all, 572 students were surveyed from 4 different universities. The English language level of all the students is certified C1.

The lecturers are two females and two males. All of them have similar teaching experience, ranging from 15 to 16 years, and they mainly teach ex-cathedra lectures, although some interaction is present in the form of student questions.

3.2 *Instrument*

As far as quantitative data analysis is concerned, a two-tailed t student test was used. The t-test is used to understand if two distributions are statically, and significantly, different from each other. T-test results were complemented by calculating p-values; thus making the analysis more robust. To answer the research questions, we compared the results of the EMI and IMI teaching mode for every single course. Then, we also compared the results of the BA degree course (Physiopathology) with the results of MA courses (Economics, Geometry and International Relations). We calculated the means of the two samples, and then we formulated the Null Hypothesis ($H_0=0$ the means of the two samples are equal, and the difference between them is due to chance) and the Alternative Hypothesis ($H_1 \neq 0$ the means of the two samples are not equal, and the difference is not due to chance). We then looked up the degree of freedom for n_1 (number of observations in sample 1) and n_2 (number of observations in sample 2) and level of significance 5% to test whether the ratio is large enough to say that the difference between the groups is not likely to have been a chance finding. If t-value is less than table value, then it is not significant. To make our analysis more robust, we also calculated the p-value, that is the probability of getting a test

²¹ *Ibidem*.

statistic value that is at least as extreme as the one just calculated: small values of p (<0.05) mean that there is more evidence against H_0 or H_1 .

Concerning the analysis of qualitative data, four interviews with the lecturers were held to investigate their stance towards EMI, to see if they were biased in any way, and if they thought the two groups were comparable. Only comments relevant to the present study were transcribed (Gillham, 2000)²². Some interviews were done via Skype while others were sent via e-mail by request of the lecturer due to time constraints. While such interviews made for more concise answers, they also resulted in less abundant data. The interviews were carried out with a semi-structured protocol, which, however, was not always followed, since the lecturers often digressed or did not specifically answer the question. Therefore, the interviews were of varying length, which depended on the personality of the interviewee and the time he or she could dedicate to the interview. The interviews were in Italian and subsequently translated into English.

4. Results: Statistical analysis

In the following tables we describe the results of the comparison between the EMI and IMI teaching modes for every single course (tables 1-4) and of the comparison between the EMI and IMI modes for MA courses, i.e. Economics, Geometry and International Relations (table 5).

Table 1 Comparison of students' outcomes in the General Physiopathology course

<i>General Physiopathology</i>	<i>Sample</i>	<i>Mean</i>	<i>T-test</i>	<i>DF</i>	<i>p-value</i>
English-taught Course	79	24.86	-10.0087	264	0.00002
Italian-taught course	187	28.79			

In this case, the t -test value (-10.0087) is associated with a p -value smaller than 0.05, so we can conclude that the means are statistically different and the difference is not due to chance. The difference between the two means suggests that there is a significant decrease in the learning results observed for the English-taught course with respect to the Italian-taught one.

²² B. Gillham, *Case Study Research Methods*, Continuum, London 2002.

Table 2 Comparison of students' outcomes in the Economics course

<i>Economics</i>	<i>Sample</i>	<i>Mean</i>	<i>T-test</i>	<i>DF</i>	<i>p-value</i>
English-taught Corse	111	27.53	-0.105	174	0.91
Italian-taught course	65	26.58			

For Economics students, p-value 0.91 is greater than 0.05 (or 5%), so it can be concluded that there is no difference between the means.

Table 3 Comparison of students' outcomes in the International Relations course

<i>International Relations</i>	<i>Sample</i>	<i>Mean</i>	<i>T-test</i>	<i>DF</i>	<i>p-value</i>
English-taught Corse	18	27.36	0.17	34	0.86
Italian-taught course	18	27.08			

In the International Relations course p-value 0.86 is greater than 0.05. Thus, it can be concluded that there is no difference between the means.

Table 4 Comparison of students' outcomes in the Geometry course

<i>Geometry</i>	<i>Sample</i>	<i>Mean</i>	<i>T-test</i>	<i>DF</i>	<i>p-value</i>
English-taught Corse	44	28.6	6.71	58	0.0000
Italian-taught course	50	30			

The average marks for the geometry classes are statistically different. The p-value is close to 0, so it is reasonable to conclude a refusal of the null hypothesis. The difference between the two means is significant because it is not due to chance; this means that in this case the IMI course has given better results than the EMI one.

Finally, table 5 shows what happens if we compare the two teaching modes only for MA courses, that is Economics, Geometry and International Relations.

Table 5 Comparison of students' outcomes in MA courses
(Economics, Geometry and International Relations)

<i>MA courses</i>	<i>Sample</i>	<i>Mean</i>	<i>T-test</i>	<i>DF</i>	<i>p-value</i>
English-taught Course	173	26.6	1.81	305	0.06
Italian-taught course	134	28.6			

In this case, t-test value is 1.81, and the p-value is greater than 0.05. Thus, we can say that the statistical test has not yielded significant results and that H_0 holds true. This means that if we consider only graduate courses, and we therefore do not take into consideration the BA course in General Physiopathology, the difference between marks in the two teaching modes is due to chance.

5. Results: Interview analysis

The first two interviews described below were part of the published pilot study, and thus they will only be summarized. The original extracts are instead provided for the other two.

The Economics professor at a private university has regularly taught in English since September 2003, with two parallel groups since February 2007. She says that for her it has been impossible to replicate the same type of teaching she does in Italian, especially in terms of the delivery of content. She is very enthusiastic about the EMI experience and says it is a source of pride for a lecturer to be able to do both types of courses. She believes the two groups she teaches this year are comparable, adding: «But we'll ultimately know when we get the exam results...», thus showing she has no pre-conceptions about the results and has not ruled out being surprised by them. On the other hand, she believes that differences existed in past years, stating that the classes in English were slightly different, in the sense that there was more interaction, perhaps due to an initial self-selection process (the EMI students had lived abroad, and were thus more used to interacting in English). She added that perhaps today English is more readily available to everyone.

The International Relations lecturer has taught for 15 years, 10 of which in English and for 2 years with parallel groups. He judges the experiences positively, stating that the two groups are comparable, even if the teaching in Italian is more formal and the EMI students are more involved in the courses. However, he does not think there are substantial differences, while noting that the group in English has greater previous and more uniform knowledge to some extent.

The Geometry lecturer has taught in English since 2001 and with parallel groups since 2013. His view of the experience is «essentially positive: it helps the lecturer, who is thus able to master the use of English for his discipline, while also being of great help to students, who become familiar with the technical terms of the subjects in question». However, he believes that when an internationalisation process is begun, a difference among subjects must be considered:

Holding classes in English is without doubt a positive development from all points of view, for both lecturers and students. Nevertheless, the speed of the internationalisation process regarding teaching depends on the subject in question. From my experience with mathematics, it is difficult, even if not impossible, to illustrate in a language other than the mother tongue what lies behind mathematical formalism.

When asked about the differences between the L1 and L2 he states:

I have tried to maintain the same style as much as possible, but obviously it's not easy. Teaching a course in a language that is not your mother tongue does not allow you as many digressions and observations to go along with the technical explanations. As far as my mastery of English permits, I try to accompany my technical explanations with reflections and digressions, as I do in the course taught in Italian.

When assessing the IMI and EMI classes, he says they are comparable, although he reveals a slight bias:

I've noted a difference in student performance: in terms of marks, the class following the course taught in English has a slightly worse performance. However, this could obviously depend, in my view, on several things: a modest ability of the lecturer to transmit the content in a language different from his mother tongue, limited knowledge of English by the students, and different backgrounds among the students (I taught the two courses in two different universities). Nevertheless, I've observed that the average level of understanding (or level of study) is lower in the course taught in English. As proof of this, at times during the exams held in English I've had to ask a student to answer in Italian when he or she cannot give the answer in English. However, even in Italian the student was not able to answer.

The last comment shows that perhaps it is not only the language that is the measure of understanding (seeing that some students did not even know how to respond in Italian) but more the type of cohort. In short, this lecturer is not totally convinced about EMI teaching.

The General Physiopathology lecturer has taught for 15 years, and since 2011 in English with parallel groups. She holds that the groups are comparable and has a positive view toward the experience:

Having lived abroad, I don't have particular difficulties with the language. Therefore, the teaching is interactive and, it seems to me, pleasing, as also confirmed by the student evaluations. I haven't noticed great differences between the two groups. Perhaps the course in Italian, having more students, also includes some more difficult cases to deal with.

The only difference she has noted involves the class in Italian, which, being larger, is more difficult to manage.

6. Discussion and Conclusions

This paper has sought to analyze the differences between IMI and EMI lectures regarding content acquisition. In terms of our research questions, the study has provided the following results.

Regarding the comparability of the two groups (IMI and EMI), the lecturers state that they are in fact comparable. However, at times they recognize there are some differences and reveal some perplexity regarding EMI, which may have influenced their marking.

Regarding the learning outcomes (Research question 1 - RQ 1), the results of the study are in contrast with similar studies at the tertiary level of education. There appears to be a difference in the acquisition of content on two main levels: the first is represented by the type of degree course, (Master's vs Bachelor's); the second is represented by the subject matter taught (humanistic vs scientific).

In fact, at the Bachelor's level EMI appears to reduce the acquisition of content with respect to courses taught in the mother tongue (Research Question 2 - RQ 2). This finding is not in line with the study by Dafouz et al. (2014)²³, where there appeared to be no disadvantage for Bachelor's courses in Economics. At the Master's level, though, there is no evidence of any detriment to content learning in the EMI group. At the same time, in our study there is a difference related to the discipline being taught. Economics and International Relations cohorts do not show statistically different results in content acquisition. Also Dafouz et al. (2014)²⁴ found a difference linked with the subject, suggesting that content acquisition was limited in History courses, whereas this was not the case with subjects in the economics area taught in English. On the other hand, in our study the results for science courses were different when taught in English; that is, content acquisition was lower for the EMI classes in Geometry and Physiopathology. This result is partly in line with research by Kuteeva and Airey (2014)²⁵ and suggested by Dimova, Hultgren and Jensen (2015)²⁶, who maintain that informed choices must be made regarding the subjects to be taught in English. In our case, the question remains open: do these differences depend on the choice of the language of instruction or are they connected with the type of discipline and degree level?

The present study has shown that learning outcomes are highly variable, and it cannot be excluded that contextual factors other than the ones we have investigated also play a role. For instance, the lecturers' individual characteristics, differences regarding knowledge construction, the part of the country where the university is located or the year in which the course is given

²³ E. Dafouz – M. Camacho – E. Urquía, 'Surely they can't do as well': a comparison of business students' academic performance in English-medium and Spanish-as-first-language medium programmes, "Language and Education", 28, 2014, 3, pp. 223-236.

²⁴ *Ibidem*.

²⁵ M. Kuteeva – J. Airey, *Disciplinary differences in the use of English in higher education: Reflections on recent language policy developments*, "Higher Education", 67, 2014, 5, pp. 533-549.

²⁶ S. Dimova – A.C. Hultgren – C. Jensen, *English-medium Instruction in European Higher Education: Review and Future Research*, in *English-medium Instruction in European Higher Education* (Language and Social Life, 4), S. Dimova – A.C. Hultgren – C. Jensen ed., De Gruyter Mouton, Berlin 2015, pp. 317-324.

could also be taken into consideration. Therefore, we hope that other studies will follow the present one, with both experimental and control groups, using statistics as a tool for analysis.

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