Cross-Cultural Psychology and the Rise of Academic Capitalism:

Linguistic Changes in CCR and JCCP Articles, 1970-2014

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Abstract

Recently, several studies have investigated developments in academic language over the last four decades: An analysis of a large number of PubMed abstracts (Vinkers, Tijdink, & Otte, 2015) showed a dramatic rise in use of positive words such as 'innovative', 'robust', 'novel', and 'unprecedented'. In the field of psychology, Pritschet, Powell, and Horne (2016) found an increase in mentions of 'marginally significant' statistical findings and social psychologist Michael Billig (2013) raised concerns about a surge of technical jargon in the social sciences. All these phenomena are believed to be a consequence of higher publication pressure and the need to become 'visible' as a researcher in an increasingly competitive climate that is often referred to as 'academic capitalism' (Slaughter & Rhoades, 2004). In our study, we tested the aforementioned indicators of linguistic change for a sample of 1,680 research articles from the Journal of Cross-Cultural Psychology (JCCP) and 657 research articles from Cross-Cultural Research (CCR), published between 1970 and 2014. Overall, we found a consistent increase in positive framing, a rise in reports of marginally significant statistical findings, as well as indicators for growth in technical jargon. These findings indicate that self-marketing strategies are also on the rise in cross-cultural psychology.

Keywords: linguistic change, cross-cultural psychology, academic capitalism, publish or perish, positive framing

The limits of my language mean the limits of my world (Wittgenstein, 1922, 5.6).

Science is a part of the social world and the social world undergoes changes. For the last 250 years, there has been an exponential growth of scientific publications, with up to approximately 2,000,000 scientific publications in the year 2012 alone (Sarewitz, 2016). The most dramatic changes in academic publishing happened in the 20th century when industrial societies were transformed into information societies (Castells, 2010). Increasingly, universities found themselves competing for students and financial resources, and the amount of scientific publication emerged as a preeminent criterion of individual researchers' and academic institutions' quality. Whereas in 1969 only 50 percent of academics in US-American universities had published during the previous two years at all, this figure had already risen to two thirds by the 1990s (Billig, 2013, p. 22). Publishing in prestigious academic journals was also no longer a privilege solely for researchers at a few distinguished universities, but became a requirement for 'college professors' and academics outside the US and Western Europe as well (for an overview see ibid, p. 11ff.). The advent of the internet as a mass phenomenon and the increasing number of open access journals may nowadays even accelerate the increase in academic publications per year. Apart from 'publish or perish', 'get visible or vanish' seems to be a further trend of the day: It is not only important to publish a lot, one's research must attract the attention of the scientific community as well as of the general public (Doyle & Cuthill, 2015). The term *academic capitalism* is now often used to compare the increasing struggle for excellence in a globalized academic world to the fierce competition in boundless economic markets (Slaughter & Rhoades 2004; Münch 2014; Schneickert & Lenger, 2016).

Over the last years, several studies have investigated whether these changes in the organizational foundations of science have also led to changes in the language of academic

publications in the form of (a) increasingly positive framing, indicated by the use of a higher number of words with positive connotations accompanied by exaggeration of the importance of research findings, (b) increasing willingness of scientists to report rather small and potentially uncertain statistical effects as 'marginally significant', and (c) increasing use of technical jargon and overly complicated language. We argue that as part of the general trend towards more competition in academia, self-marketing has increasingly become the inherent logic of academic writing also in the field of cross-cultural psychology over the last decades.

Previous Studies

Positive framing

The Pollyanna hypothesis states that there is a universal human tendency to use 'positive' words more frequently, diversely, and facilely than 'negative' words (Boucher & Osgood, 1969). This tendency has been confirmed in large text corpora and for different languages (Garcia, Garas, & Schweitzer, 2012). However, over and above this general preference for positive words – which should be time-invariant – longitudinal changes have been observed in the relative frequency of positive word usage. Linguistic analyses show that the language style of scientific publications in medicine and related fields has changed substantially over the last four decades. For example, an analysis of all PubMed abstracts from the years 1974 to 2014 revealed an increase in usage of 880 percent for a selection of 25 positively connotated words. This increase has been driven in large part by the more frequent use of words such as 'robust', 'unprecedented', and 'innovative'. The frequency of negatively connotated words increased significantly as well, but to a smaller degree (Vinkers, Tijdink, & Otte, 2015). This finding is widely interpreted to be the result of a marked rise in the use of advertising language in scientific publications thought to be due to higher publication pressure as well as increasing reliance on external funding (Moore, Neylan, Eve, O`Donnell, & Pattinson, 2016).

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In contrast to this dramatic increase of such language in medical literature, the picture for written expressions in general is ambiguous. For the Google Ngram corpus[1] of 8 million digitized English language books, linguistic analyses revealed a general decrease in the use of emotion-related words throughout the 20th century and periods of positive and negative affect (Acerbi, Lampos, & Bentley 2013). For song lyrics, a decrease in their 'happiness' from the 1960s to the 1990s was shown, while for blogs an increase in 'happiness' from 2005 to 2009 was found (Dodds, Sheridan, & Danforth, 2010).

Highlighting the significance of findings even when they are marginal

Pritschet, Powell, & Horne (2016) have shown, based on an analysis of over 1,500 articles from top-tier psychology journals, that the practice of describing *p* values as 'marginally significant' became more common in cognitive psychology, developmental psychology, and social psychology between 1970 and 2010, with a peak in 2000 in the latter two sub-disciplines. The slight decrease since then could be a consequence of the mounting criticism of the use of significance tests in psychology (e.g., Gigerenzer, 2004) and the emergence of Bayesian statistical methods (e.g., Gelman, Carlin, Stern, & Rubin, 2014). In view of the current 'crisis of confidence' (Pashler & Wagenmakers, 2012) or 'reproducibility crisis' (Open Science Collaboration, 2015), 'p-hacking' – the practice of using questionable research practices to achieve statistical significance in order to increase the chances of getting published has become a topic of intense debate, particularly in the field of social psychology. A generous use of the label 'marginally significant' for weak effects – at least in cases where they support the researcher's hypothesis – corresponds well with the general picture of increasing pressure to advertise one's research. Under such circumstances, researchers would be all to ready to find their hypotheses confirmed.

Technical jargon and nominalization

In 2013, Michael Billig summarized two decades of research into academic 'jargon' in such diverse fields as discourse analysis and 'mainstream' experimental social psychology in his book 'Learn to write badly: How to succeed in the social sciences'. His main argument is that increasing publication pressure and the vast number of scientific publications lead to the development of more and more disintegrated scientific sub-communities. Such groups use their own jargon and their own increasingly complex and complicated idiosyncratic terminology to set themselves apart from other communities, who may investigate the very same phenomena using the very same research methods.

One consequence is an increasing 'nominalization' of scientific language: processes or series of events are turned into things. For example, "It is simpler to use 'deindividuation', rather than repeatedly employ a clause such as 'being in a state of mind of not feeling oneself to be an identifiable individual'" (Billig, 2011, p. 11). Of course, this is not bad in itself, but it should be noted that nominalization leads to a more imprecise language, although it may sound more technical and precise: The term 'deindividuation' does for example not entail the information as to who actually does not feel identifiable anymore. Through nominalization and the related passivization, or writing about processes in the passive voice, scientific texts are 'depersonalized': People and actions are removed from psychological analyses, although they are (or should be) the central subject of investigation. Even worse, these fictional things, which are nothing more than descriptions of processes, can take on 'a life of their own' and become the guiding idols of these scientific sub-communities.

Apart from 'publish or perish', academic research depends more and more on external funding as well. According to Billig, one consequence of this increasing need to attract funding is a more frequent use of the claim that 'more research (= more money) is needed' to pursue research questions that were opened up through an empirical study (Billig, 2013).

Research questions and rationale

In the present study, we investigated to what degree cross-cultural psychology as a field of study was affected by the changes mentioned above. In so doing, we also intended to contribute to the ongoing self-reflection among scholars in general, and in the *Journal of Cross-Cultural Psychology (JCCP)* in particular (cf. Allik, 2012; Best & Everett 2010; Browers et al. 2004; van de Vijver & Lonner 1995). The investigation was carried out in direct comparison to *Cross-Cultural Research (CCR)*, another multi-disciplinary journal that publishes comparative studies.

Despite the fact that several textbooks discuss the diversification of cross-cultural psychological topics during the past several decades (e.g., Smith, Bond, & Kagitcibasi, 2006), no empirical research has yet investigated similarities and differences in terms of topics and linguistic features between these two journals. Consequently, it is currently unknown whether the distinct content of JCCP and CCR or changes in their topic preferences relate to general linguistic trends displayed in their published articles.

To provide a context for our study through a preliminary comparative linguistic examination of our research material, we start by identifying the words that show the clearest differentiation between the JCCP and CCR articles and examine general topic-related changes within the two journals between 1970 and 2014. We then continue with the main analysis, investigating (a) whether there was substantial change in the expression of positive and negative emotions; (b) whether the frequency of the use of terms that indicate marginal significance increased; and lastly (c), whether the use of words made up of more than six letters rose, whether the use of common verbs decreased, whether the frequency of 'nominalizations' expanded, and whether the claim that 'more research is needed' was expressed more frequently.

Our methodological approach differs to some degree from the aforementioned previous studies. Vinkers, Tijdink, and Otte (2015) had used self-constructed word-category scales comprising no more than 25 words and they only analyzed the abstracts of scientific publications. In our analysis, we used these self-created dictionaries in direct comparison to the 'positive emotions' and 'negative emotions' scales of an established psycho-linguistic dictionary – the LIWC (Linguistic Inquiry and Word Count) 2015 internal dictionary. Using the Vinkers et al. measure (25 positive words) comparatively with the LIWC dictionary (625 positive words) allowed us to establish whether upward trends in positive word usage were restricted to a small number of specific 'buzzwords' or were part of a much broader linguistic base. Furthermore, we went beyond the scope of their work by analyzing not only abstracts but also the entire bodies of the CCR and JCCP articles' texts.

Pritschet, Powell, and Horne (2016) had manually coded their research articles for instances of reports of marginally significant effects. In our study, we decided to use a linguistic approach by constructing a word category scale comprised of synonyms and indicators of marginally significant statistical effects (see below). Although this approach has its limitations when it comes to accuracy (see the discussion section), it allows for an automatized analysis of higher numbers of publications.

Michael Billig's critique is on the one hand based on a qualitative in-depth analysis of a small number of academic publications (e.g., 2013, p. 143ff.). On the other hand, he bases his claims on studies which focused on comparing academic writing in textbooks (Biber, Conrad, & Cortes, 2004) or a very broad range of scientific articles from different disciplines (Biber & Gray, 2010) to everyday language. Our study focused on longitudinal developments over a selected time period for a specific field of study: Cross-cultural psychology.

Method

General Approach

The main focus of this paper is on the linguistic changes in JCCP and CCR articles between 1970 and 2014. As a means of establishing a context for our findings, we also included analyses of general linguistic differences between JCCP and CCR and of general linguistic trends over the given time period.

Contextualization

We used the AntConc software (Anthony, 2005) to identify the words that predicted best whether an article was from the JCCP or the CCR corpus using a comparative linguistic approach. The software compares two (or more) text corpora and identifies the words that have the highest 'keyness' or ability to differentiate between the corpora. As a means of establishing a context for our findings, we also examined general linguistic trends and topic-related changes for the two journals by identifying keywords for the respective articles from different time periods, again, using the AntConc software. For this analysis, the data were split into three time periods, namely, 1970-1984, 1985-1999, and 2000-2014. In specific, this analysis identified the words that differentiated the most clearly between one of the time periods and the other two time periods. It thus also allowed for illustrating changes in the research focus of these two journals over time.

Analysis of Linguistic Changes

We used the LIWC 2015 Software (see Pennebaker, Boyd, Jordan, & Blackburn, 2015) to analyze the prevalence of words within a given category in comparison to the total number of words within a document. The LIWC-software originated from a software tool that was developed as part of a research project on language and self-disclosure (Pennebaker, 1993). The current version LIWC 2015 is a proprietary analysis software, which, like its predecessor

LIWC 2008, has been and is being used in a large number of scientific and commercial studies. Word categories were created to measure an underlying abstract construct in analogy to a psychometric scale (Ibid., p. 2). The approximately 90 (depending on the exact version) LIWC-scales are the result of a thorough and elaborate construction process that comprises not only expert ratings of the 'goodness of fit' of a word for a given scale, but also statistical evaluations of the scales' psychometric properties (Pennebaker, Boyd, Jordan, & Blackburn, 2015, p. 5-6). A closer description of all research material and word category scales we used can be found below.

Trend analysis. For a first visual inspection of the developments over time, we show trends graphically using local polynomial smoothing via the 'lpoly' command in Stata 12. This technique performs an Epanechnikov kernel-weighted local polynomial regression and displays a graph of the smoothed values with a 95 percent confidence interval. Local polynomial smoothing is a non-parametric modeling approach, which means that instead of assuming a certain functional fit (e.g., linear, exponential, etc.) ex ante, the data 'speaks for itself' (Gutierrez et al., 2003). This property is thus beneficial for exploratory purposes where we want to first smooth the data without imposing assumptions about their distribution. The smoothing itself is reasonable, as the papers we chose might well have been published a year earlier or later depending on arbitrary delays in the review process. The graphical analyses also allow us to identify non-linear effects such as changes within a certain time period during the sampling frame. Furthermore, the graphical analyses allow for a direct comparison of the developments in the JCCP and in the CCR articles.

Since the local polynomial smoothing reveals trends that often appear monotonic (but not necessarily linear), we used Spearman's rank correlation coefficient r_s to assess the strength and statistical significance of these monotonic changes. In order to additionally get an impression of what these up- and downward changes meant in substantial terms, we

compared the mean relative frequency of the phenomenon under study (e.g., positive words) in the early years (1970-1984) to the mean relative frequency of the phenomenon in the later years (2000-2014) via unpaired t-tests (which were, for instance, also used by Vinkers et al., 2015). This division of the time frame under study corresponds to the one used for the contextualization analysis (see above). Taken together, these measures allowed us to gain a comprehensive picture of the linguistic trends observed.

Data

We analyzed publications classified as 'research articles' that were published between 1970 and 2014 in *Journal of Cross-Cultural Psychology* (1,680 articles) and *Cross-Cultural Research* (657 articles). Overall, more than 15 million words were processed.

The articles were split into an 'abstract' and a 'text body' section, with the latter comprising the main document without tables, figures, references, and appendices. For the analysis of positive and negative emotions, we started with an analysis of the abstracts. On the one hand, this step enabled us to compare our findings with the results obtained in other fields of research (e.g., Vinkers, Tijdink, & Otte, 2015). On the other hand, it is also important in its own right because the abstracts constitute the information about a study that is often most accessible to the wider public via catalogues such as EBSCO or search engines such as Google Scholar, which makes them particularly interesting as a 'marketing tool'. Next, we addressed the question of whether the rise of positive words only applied to the abstracts or whether all of the academic language as represented by the text bodies was affected as well. If an increase in the use of marketing language also occurred in the text bodies, this would indicate that the changes in academic writing do not just affect 'the surface' of academic publications (i.e., the titles and abstracts), but go much deeper. For the remaining analyses, only the text bodies were used.

Scales from Vinkers, Tijdink, & Otte (2015)

Positive 25 & Negative 25. In line with the previously mentioned study by Vinkers, Tijdink, & Otte (2015), we used the original 25 positive words ('Positive 25'; e.g., amazing, spectacular) and the original 25 negative words ('Negative 25'; e.g., disappointing, unacceptable) that had been used in their study. The complete word lists can be found in the original publication (p. 3). We decided to leave out the 25 neutral words, because most of these words appeared to be closely related to medical topics (e.g., 'blood', 'bone', 'disease', …).

Top four positive words. We also created a category scale comprising the four words 'robust', 'novel', 'innovative', and 'unprecedented', whose frequencies increased particularly dramatically in the study by Vinkers, Tijdink, & Otte (2015, p. 1).

Scales from the internal LIWC 2015 dictionary

LIWC Positive Emotions. This scale is comprised of 620 words. Examples are 'love', 'nice', and 'sweet' (Pennebaker, Boyd, Jordan, & Blackburn, 2015, p. 3). Its corrected internal consistency is =.64 (p. 8).

LIWC Negative Emotions. This scale is made up of 744 words. Examples are 'hurt', 'ugly', and 'nasty' (Pennebaker, Boyd, Jordan, & Blackburn, 2015, p. 3). Its corrected internal consistency is =.55 (p. 8).

LIWC Verbs. This scale comprises 1,000 verb forms of common verbs. Examples are 'eat', 'come', and 'carry' (Pennebaker, Boyd, Jordan, & Blackburn, 2015, p. 3).

LIWC 6-Letter Words. All words comprised of at least six letters were counted here. This measure has been used as an indicator of text difficulty in numerous studies in the tradition of Flesch (1948).

Self-constructed scales

Marginal significance. We constructed this scale from different expressions that are related to the concept of marginally significant statistical effects ('marginally significant', 'p < .10', 'p < .10', p<.10, 'p .10', 'marginal significant', 'marginal significance', 'trend towards significance', 'trended towards significance', 'trending towards significance', 'approaching significance', 'approached significance').

Nominalizations. For this scale, we first made a list of all 4,235 words ending with the suffixes '-ation', '-ity', and '-ment'. A student assistant then removed all entries that were obviously not related to Billig's use of the term 'nominalization' (such as 'city', 'personality', 'education', 'development'). After further revision through the authors, we finally settled on a list of 243 words. The full list can be obtained from the authors.

Results

Unique aspects of JCCP and CCR articles

A comparison of the 25 words with the highest 'keyness' (i.e., the best predictors of whether an article was from the JCCP or the CCR corpus; Table 1) showed that in the JCCP articles, terms from the field of psychology such as 'personality', 'values', and 'acculturation' had been used more frequently than in the CCR articles. On a similar note, statistical terms such as 'items' and 'subjects' were typical for JCCP articles, as well as words indicating a research focus on East Asia such as 'Chinese', 'Japanese', and 'Hong Kong' (presumably being compared to US-Americans and other Westerners). The term 'differences' was more frequently used as well in the JCCP articles. In the case of the CCR articles, words that are related to a more humanities-oriented approach such as 'anthropology', 'ethnology', and 'evolution' were more frequent. Also terms referring to databases, such as 'Ethnographic Atlas', 'Standard Cross-Cultural Sample (SCCS)', and 'The Human Relations Area Files

(HRAF)' or specific methodological terms, for example '(spatial) autocorrelation', were more typical for CCR articles. Similarly, there was a clear difference between the CCR and JCCP articles in the use of words that represent cultural practices such as 'polygyny', 'subsistence', 'marriage', 'codes', or 'warfare'. Taken together, JCCP represented a more psychology-oriented quantitative approach towards cross-cultural research, whereas CCR seemed to be leaning more towards a descriptive humanities-oriented approach.

*** Table 1 about here.

General linguistic and topic-related changes in the two journals between 1970 and 2014

Next, we examined general linguistic trends for the two journals by identifying keywords for the respective articles from the time periods 1970-1984, 1985-1999, and 2000-2014. See Table 2 for developments within the JCCP articles and Table 3 for developments within the CCR articles.

JCCP. While until 1999 the term 'subject(s)' was used frequently, in more recent articles, authors referred to 'participants' or 'individuals'. The increasing use of 'we' seems to indicate that, from about the year 2000 on, more papers were authored by more than one researcher, compared to earlier decades. An alternative explanation might be that the practice of using 'we' to include the reader even when a paper is single-authored has become more common.

The origin of samples (Mexican→Japanese→Nso) and the most cited researchers (Piaget→Triandis→Schwartz) changed over time as well. We also observed changes in topic preferences: JCCP developed from a journal with a developmental focus (1970-1984: 'children', 'grades', and 'schools'), over a period in which cultural uniqueness was emphasized (1985-1999: 'etic', 'emic', 'Inuit'), into an outlet with a focus on statistical modeling approaches (2000-2014: 'RMSEA' (root mean square error of approximation) and

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'fit'). These changes in research methods might also indicate a shift in JCCP's focus from cross-cultural differences to similarities (e.g., 'invariance').

The analysis also sheds light on the topics that were in the focus of research during the respective time periods: Understanding cultural differences in 'perceptual illusions' and Piaget's 'conservation task' marked the beginning of modern cross-cultural psychology (≤ 1984), followed by a period of research on cultural differences in the tolerance of silence and personality (1985-1999; e.g., the Minnesota Multiphasic Personality Inventory [MMPI]). Since 2000, a small number of theoretical models seem to have dominated the field (self-construals, acculturation, and autonomy versus relatedness; for a review, see Smith et al., 2006). Some traditional topics, such as child development ('parenting' and 'children's'), regained the interests of researchers publishing in JCCP, while we also observed the emergence of new topics, such as, 'honor', 'values', and 'satisfaction'.

*** Table 2 about here.

CCR. Until 1984, the focus of CCR was on 'societies', whereas 'subjects' or 'participants' were studied more frequently in more recent articles. From 2000 to 2014, differences between societies ('national', 'countries', 'country') were again increasingly emphasized.

We found for the CCR as well that each time period represented the legacy of only a few outstanding researchers (Naroll→Murdock→Barber). In terms of topic-related changes, from 1970-1984, the focus was on data from ethnographic datasets (HRAF [Human Relations Area Files], HABS [HRAF Automated Bibliographic System], Ethnographic Atlas). Researchers frequently debated critical issues in their field ('Galton's problem', 'autocorrelations', 'bias'), and the topics of studies were phenomena such as matrilocal residence and warfare between groups. From 1985 to 1999, a number of new topics came into

fashion which were related to 'moral', 'justice', 'homosexuality', and scarcity of resources ('famine', 'starvation', 'envy'). Since 2000, terms associated with child development and parental practices had high 'keyness' in the CCR corpus ('acceptance', 'adjustment', and 'paternal'). These topic preferences seemed to go along with the increased description of mental processes ('self' and 'psychological'), and, similar to JCCP (see above, 'satisfaction'), the emergence of positive psychology (e.g., 'happiness') as a new field of interest for cross-cultural researchers.

*** Table 3 about here.

The expression of positive and negative emotions

A visual inspection of the first row of smoothed graphs in Figure 1 shows that across all measures, in both journals, and both in the abstracts and text bodies, the frequency of positive words appears to increase. The extent of the increase, however, differs. The trends in the usage of negative words, by contrast, are much more ambiguous with a mixture of increases, decreases, and reverse u-shaped patterns.

Analysis of the abstracts. The relative frequency of the 25 positive words from Vinkers et al. (2015) increased significantly in both JCCP ($r_s = .05$, $p < .05$) and CCR ($r_s = .15$, $p < .001$) abstracts. Although the increase is stronger in CCR, it should be noted that in substantial terms, CCR started from an exceptionally low initial level with virtually no mentions of these 25 positive words in the first fifteen years under study (mean = 0.00), rising significantly ($t(426) = 2.68$, $p < .01$) to a relative frequency of on average .04 percent of all words in the last fifteen years (for additional figures such as standard deviations, see Tables A2a and A2b in the appendix). JCCP by contrast had a higher initial starting point (mean = .04%) and remained above CCR in the end (mean = .05%) despite the lower increase ($t(1230) = .93$, $p = .35$; Figure 1a).

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The LIWC positive emotions scale also shows significant monotonic increases over time in both JCCP ($r_s = .16$, $p < .001$) and CCR abstracts ($r_s = .31$, $p < .001$). Again, we found a stronger increase for the CCR abstracts, with a rise from an average 1.69 percent to an average 2.88 percent ($t(426) = 5.70$, $p < .001$). In JCCP, the frequency of positive emotions increased from a mean of 1.91 percent to a mean of 2.87 percent ($t(1230) = 7.35$, $p < .001$) (Figure 1a).

Regarding negative emotions, CCR abstracts showed no sign of monotonic change using the 25 negative words scale by Vinkers et al. (2015) ($r_s = .00$, $p = 1$) or the LIWC negative emotions scale ($r_s = -.07$, $p = .11$). In JCCP, however, there appeared to be a slight increase at least with regard to the broader set of negative emotions in LIWC ($r_s = .05$, $p < .05$). For the 25 negative words by Vinkers et al., this increase did not reach statistical significance ($r_s = .04$, $p = .086$). A closer look at the CCR abstracts revealed an unusually high number of negative emotions (LIWC) in the late 1980s, which might be related to the specific research focus of this journal in this period, which was characterized by a high frequency of negatively connoted key terms such as 'famine', 'envy', 'jealousy', 'deterrence', 'starvation', and 'rape' (see Table 3).

Analysis of the text bodies. In the text bodies (Figure 1b), the increase in expressions of positive emotions seemed to be more substantial and more homogeneous in both journals than it was for the abstracts. The usage of the 25 positive words identified by Vinkers et al. (2015) increased significantly in both CCR ($r_s = .22$, $p < .001$) and JCCP ($r_s = .23$, $p < .001$) between 1970 and 2014. In substantial terms, the relative frequency doubled in both journals from an average .02 percent in the first fifteen years to .04 percent in the last fifteen years (CCR: $t(487) = 3.52$, $p < .001$; JCCP: $t(1223) = 4.54$, $p < .001$). The effect is even stronger for LIWC's broader set of positive emotions (CCR: $r_s = .36$, $p < .001$; JCCP: $r_s = .31$, $p < .001$). Here, the relative frequency of positive emotions increased by .74 percentage points

from 1.65 to 2.39 percent ($t(1223) = 11.61$, $p < .001$) in JCCP text bodies and .61 percentage points from 1.55 to 2.16 percent ($t(487) = 6.99$, $p < .001$) in CCR text bodies.

In addition, we looked at the four positive words that had the greatest impact in the study by Vinkers et al. (2015; 'robust', 'novel', 'innovative', and 'unprecedented'). Again, we found significant upward trends (CCR: $r_s = .22$, $p < .001$; JCCP: $r_s = .27$, $p < .001$) and the relative change in the use of these four words seemed to be larger than it was for the other two measures for positively connotated words. The relative frequency of these four words tripled in JCCP papers, rising from .003 to .009 percent ($t(1223) = 5.27$, $p < .001$) and quadrupled in CCR articles, rising from .003 to .012 percent ($t(487) = 2.14$, $p < .05$). Note that an equivalent analysis for the abstracts could not be conducted since almost 99 percent of all abstracts did not contain any of the top four positive words, leaving too little variance for meaningful trends to be observed. This lack of usage in the abstracts provides further evidence that the abstracts did not have a special 'advertising' function. The linguistic change towards more positive words also affected the full texts, at least in cross-cultural psychology.

By contrast, almost no meaningful changes in the expression of negative emotions could be observed in the text bodies. Neither the LIWC ($r_s = -.04$, $p = .31$) nor the Vinkers et al. measure ($r_s = -.04$, $p = .29$) of negative words changed significantly over time in CCR articles. In JCCP, the Vinkers et al. measure also did not show any effect ($r_s = -.00$, $p = .90$), while the LIWC scale indicated a minor upward move ($r_s = .06$, $p < .05$).

A further observation is that in line with the Pollyanna hypothesis, using the respective LIWC dictionaries, positively connotated words occurred on average more frequently than negatively connotated words in both JCCP abstracts (2.43% positive emotions vs. 1.26% negative emotions; $t(1679) = 16.73$; $p < .001$) and JCCP text bodies (2.04% positive emotions vs. 1.09% negative emotions; $t(1685) = 27.04$; $p < .001$) as well as CCR abstracts (2.32% positive emotions vs. 1.47% negative emotions; $t(565) = 6.65$; $p <$

.001) and text bodies (1.82% positive emotions vs. 1.22% negative emotions; $t(715) = 12.16$; $p < .001$). [2]

<div align="center">*** Figure 1 about here (1 page, landscape).</div>

The frequency of articles reporting marginally significant effects

In line with our expectations, the number of articles mentioning marginally significant effects increased over time (Figure 2). This growth trend is significant in both CCR ($r_s = .14$, $p < .001$) and JCCP ($r_s = .11$, $p < .001$) articles. The percentage share of articles mentioning marginally significant effects almost doubled in JCCP articles (from 10.6 to 20.0 percent, $t(1223) = 4.36$, $p < .001$) and almost quadrupled in CCR articles (from 3.7 to 14.7 percent, $t(487) = 4.13$, $p < .001$) between the first and the last fifteen years under study.

<div align="center">*** Figure 2 about here.</div>

The frequencies of words with six or more letters, common verbs, nominalizations, and the claim that 'more research is needed'

The frequency of long words (six or more letters) increased in both journals over time (upper left-hand graph in Figure 3). The increase was stronger in JCCP ($r_s = .39$, $p < .001$) than in CCR ($r_s = .23$, $p < .001$). In substantive terms, the increase was 3.2 percentage points (from 29.6 to 32.8 percent) between the first and the last fifteen years under study in JCCP ($t(1223) = 18.75$, $p < .001$), and 1.3 percentage points (30.3 to 31.6 percent) in CCR ($t(487) = 4.08$, $p < .001$).

In line with the previous finding, the frequency of common verbs (upper right-hand graph in Figure 3) decreased significantly in both journals. The trend was stronger in CCR ($r_s = -.32$, $p < .001$) than in JCCP ($r_s = -.08$, $p < .001$). The frequency of common verbs dropped by 6.1 percent in JCCP articles ($t(1223) = -5.98$, $p < .001$) and 13.1 percent in CCR articles ($t(487) = -6.88$, $p < .001$).

Regarding nominalizations (lower left-hand graph in Figure 3), the picture was mixed. In the JCCP articles, there was a comparatively small but significant upward trend ($r_s = .05$, $p < .001$). In relative terms, this increase was in fact quite substantial, with the frequency of nominalizations increasing by 57.6 percent ($t(1223) = 3.74$, $p < .001$) between the first and the last fifteen years under study. In the CCR articles, by contrast, the upward trend did not reach statistical significance ($r_s = .07$, $p = .07$). A closer look at the trend reveals that the higher mean in the time period from 1985 to 1999 (.15) was not significantly different from that of the earlier years 1970-84 (.11, $t(383) = 1.88$, $p = .06$) nor from that of the later period 2000-14 (.12, $t(438) = 1.10$, $p = .27$). Thus, the apparent trend reversal regarding nominalizations in CCR that is visible in Figure 3 was not statistically significant.

In line with Billig's hypothesis, the percentage of articles mentioning 'more research is needed' (lower right-hand graph in Figure 3), increased significantly in both CCR ($r_s = .10$, $p < .001$) and JCCP articles ($r_s = .12$, $p < .001$). When we compared the averages of the 1970-84 period to those of the 2000-14 period, the number of articles mentioning 'more research is needed' rose by a factor of 5 in both the JCCP articles (1.7 percent to 8.6 percent, $t(1223) = 5.08$, $p <. 001$) and the CCR articles (.5 percent to 2.6 percent, $t(487) = 1.83$, $p = .07$).

*** Figure 3 about here.

Discussion

Summary of findings

Expression of positive and negative emotions. Between 1970 and 2014, the expressions of positive emotions almost doubled across all of the different scales in both abstracts and text bodies of JCCP and CCR articles. We also found a dramatic increase in the use of the top four positive words 'robust', 'novel', 'innovative', and 'unprecedented' in the text bodies. Nevertheless, the increase is substantially smaller than the one that was reported in Vinkers,

Tijdink, and Otte (2015). Even though there seems to be a continuing trend towards more positive framing in academic language, this development seems less pronounced in the field of cross-cultural psychology than in medicine.

Notably, we not only found an increase in expressions of positive emotions in the abstracts, but in the text bodies as well. In fact, the increase is even more substantial in the text bodies than in the abstracts. This finding directly contradicts the idea that more marketing-oriented language is only a superficial phenomenon, affecting only the 'surface' of academic writing in the form of catchy titles and advertising language in abstracts. Instead, even the 'deeper substance', the text bodies (i.e., the main document excluding tables, figures, references, and appendices) are also affected.

Regarding the expression of negative emotions, overall we found inconsistent results. Whenever monotonic effects reached statistical significance, the effects were rather small. Overall, our findings do not show a consistent increase in expressions of negative emotions.

Frequency of papers mentioning marginally significant effects. The number of studies that reported marginally significant statistical effects almost tripled. These findings resemble very closely the results of Pritschet, Powell, & Horne (2016).

Indicators of technical jargon. We found an increase in words with six or more letters for the JCCP as well as for the CCR articles and abstracts. The increase was in the magnitude of 15-20 percent. Fittingly, the frequency of common verbs decreased in both journals at approximately the same pace. These findings are in line with Billig's (2011, 2013) criticism of current developments in academic language. We also found a relatively modest increase in the frequency of nominalizations for the JCCP articles, which is compatible with Billig's observation of increasing pressure on scientific sub-communities to set themselves apart from other communities through the use of new and lofty technical terms, which often serve to

'reify' processes or behavior patterns. It should be noted, however, that the increase we found seems to be dominated by the term 'acculturation', which is the most frequent term from our list of nominalizations in the text corpus. John Berry's acculturation model (Berry, 1990; Berry, 1997) emerged in the 1990s as one of the most important theoretical foundations of cross-cultural psychology. Hence, we tend to regard our findings as rather ambiguous when it comes to the question of whether there is an actual increase in the frequency of nominalization apart from 'seasonal' effects. By contrast, the finding that the frequency of the claim that 'more research is needed' quintupled over the years is strong and clear.

Similarities and differences between JCCP and CCR.

First, we looked at words that predicted most reliably whether an article was from the JCCP or the CCR corpus. We found that the JCCP corpus included more unique psychological, quantitative terms, whereas the CCR represents an anthropological, qualitative approach to culture. Despite these thematic differences, the linguistic trends we observed in this study were surprisingly similar in both journals. Nevertheless, there were few noteworthy differences regarding changes in the expression of positive and negative emotions between the JCCP and the CCR articles. Whereas for long words and common verbs there appeared to be an increase and decrease during the sampling period for both journals, respectively, long words and common verbs seemed to occur in general more frequently in the CCR articles than in the JCCP articles. It can be assumed that the more quantitative focus of the JCCP was playing a role here (see Table 1). The same may be true for general differences in the reporting of marginally significant statistical findings and for the percentage of articles mentioning that more research is needed: Here as well, the base rates seem to be slightly higher for the JCCP articles across time. We found an increase only for the JCCP articles in the frequency of nominalizations. As discussed in the previous paragraph, this finding may be

related to the increasing popularity of certain theoretical models in JCCP articles, such as acculturation theory.

How do the changes in cross-cultural psychology compare to other scientific disciplines and subfields of psychology?

As discussed above, the increase in positive framing is apparently less pronounced in cross-cultural psychology than it is in medicine and related fields (Vinkers, Tijdink, & Otte, 2015). As of the present time, no studies have compared linguistic changes in different subfields of psychology. So it remains unclear if the developments that we found in the analysis presented here are part of a general trend in the field of psychology.

Pritschet, Powell, and Horne (2016) did compare different subfields of psychology, and they found that marginally significant effects were reported slightly more frequently in social psychological articles than in developmental psychological and cognitive psychological articles (pp. 5-6). Still, for all three subfields, there was an overall increase in reporting marginal findings, with a peak around the year 2000. We found a similar pattern in the current study, although the general percentage of articles reporting at least one marginally significant effect appeared to be lower in the field of cross-cultural psychology in comparison to the three sub-disciplines that were analyzed in Pritschet, Powell, and Horne (2016; see fig. 2, p. 4). In view of the fact that Pritschet and colleagues used a coding approach, whereas we used a linguistic approach, the question remains whether these differences in the absolute frequency of articles reporting marginally significant findings is a result of different methodologies, or whether there is indeed a difference between cross-cultural psychology and the other subfields.

Research on an increasing use of technical jargon in psychology has so far primarily used a qualitative method, in the form of an in-depth analysis of a small number of selected

articles (e.g., Billig, 2008, 2011, & 2013). Hence, it is not possible at the present time to compare the linguistic changes that we found for the field of cross-cultural psychology (an increase in long words, a decrease in common verbs and – at least for the JCCP articles – a slight increase in nominalizations) with other scientific disciplines or other psychological subdisciplines.

Limitations

Our linguistic approach is prone to a number of potential biases and distortions. Potential double meanings of terms is a common problem in any linguistic investigation of a large corpus of material (e.g., Acerbi et al., 2013, p. 7). For example, the term 'phenomenal' can on the one hand be a synonym for 'fantastic' and hence be an expression of positive emotion; on the other hand, it can refer to a 'phenomenal' investigation in the form of studying concrete occurrences instead of abstract theories. The magnitude of the text corpus we analyzed rendered it impossible to counter-check every single assignment of a word to a given category. Whenever possible, we addressed this issue by means of several indicators of the same phenomenon (e.g., the different scales for expressions of positive affect) as a means of a methodological triangulation (Denzin, 1978).

It is also not possible to rule out the possibility that some cases for which researchers reported marginally significant statistical effects went unnoticed, because these effects were not explicitly described as marginally significant. Such attempts as obfuscating the marginally significant status of statistical findings could limit the validity of our findings.

Whereas we argue that the increase in expressions of emotions in these texts does not simply mirror global trends in common language but instead is a symptom of a specific trend in science, the possibility remains that developments within the field of psychology such as the emergence of the 'positive psychology' movement (Seligman & Csikszentmihalyi, 2000)

influenced our findings. However, we think that at least the 'top four positive words' scale comprising only four words which are very indicative of the increasing use of more advertising and exaggerative language should not be affected by any general trend towards more positivity. At the same time, we cannot rule out the possibility that cross-cultural psychological findings have *actually* become more 'robust', 'novel', 'unprecedented', and 'innovative'.

The question remains to what degree the linguistic changes that we and other researchers have found are related to changes in academic practices such as study design, sampling, data collection, and analysis. One could hypothesize, for example, that the increasing use of language that is indicative of self-marketing should probably correspond with a higher willingness to use questionable research practices (John, Loewenstein, & Prelec, 2012), as long as those practices help to increase a researcher's visibility and number of publications. Leggett, Thomas, Loetscher, & Nicholls (2013) found indeed an increase in p-values slightly below the 'magical' threshold of .05 for psychological articles published between 1965 and 2005. However, in a recent study, Nujten and colleagues (Nujten, Hartgerink, van Assen, Epskamp, & Wicherts, 2015) used the R-package *statcheck* (Epskamp & Nujten, 2015) to analyze errors in the reporting of statistical results in articles from eight major psychological journals that were published between 1985 and 2013. Overall, they did not find any increase over time (rather, a slight decrease). Hence, the question as to whether the linguistic changes in academic language correspond as well with changes in questionable research practices cannot be answered conclusively at the present time. For future studies, it might be a promising strategy to combine the linguistic approach described in this paper with algorithms for the detection of questionable research practices, such as *statcheck*, to test the hypothesis that there may indeed be a 'language of sloppy science'.

With regard to our dictionary for marginally significant statistical effects, we can of course not discern whether the authors reported marginally significant effects themselves or whether they were referring to studies of colleagues. However, we think that actually both cases are indicative of a willingness to display even small and uncertain statistical effects as significant.

LIWC's list of common verbs was not designed to capture typical verbs in scientific publications. Still, we find it noteworthy that even for such a rather arbitrary collection of verbs, a relatively robust, significant, and steady decrease can be found within the time period of our analysis. Together with our findings on the increasing frequency of long and presumably complicated words, we believe that – with all due carefulness – these results can be interpreted to be consistent with Billig's qualitative analysis of changes in academic language.

Of course, it would be interesting to additionally investigate changes in the prevalence of passive voice constructions. Here as well, Billig predicted an increase parallel to the increase of nominalization. At the present time, we could not find any software tool which could assess passive voice constructions in such a large text corpus reliably enough.

Implications and conclusion

The current study shows the prevalence of positive framing, the exaggeration of small effects, and the use of overly complicated language in research reports in the field of cross-cultural psychology. All of these indicators, however, might have common cause with the rise of academic capitalism (Slaughter & Rhoades, 2004; Münch, 2014). Thus, the academic writing style today increasingly includes self-marketing strategies as a consequence of increasing publication pressure and the author's need to become 'visible' as a researcher.

Michael Billig (2013, pp. 211-215) has suggested a number of recommendations for researchers to improve the linguistic quality of academic publications. Interestingly, his recommendations stand in the tradition of George Orwell's critique of political language (1946/2013): use simple language whenever possible, reduce the number of passive sentences (this is in line with the APA style guide), preferably use verb phrases over noun phrases, re-personalize psychological texts by writing more about persons and less about artificial processes and phenomena by utilizing 'big words', and avoid being overly attached to technical terms in order to avoid adopting a sales representative's attitude in promoting your pet concepts over others. He also recommended not to take his recommendations too seriously and to ignore them whenever it seems appropriate.

It should be noted that Orwell's original suggestions were referring to the language employed in authoritarian regimes such as the Soviet Union. In authoritarian language, linguistically deleting the actors and replacing common language expressions with technical terms serves the function of immunizing the ruling regime against criticism, suppressing alternative discourse in society, and bringing society into line. It is of course a somewhat frightening idea that changes in academic language resemble changes that in the realm of politics go along with a loss of personal freedom and societal diversity. We do not want to say that this is what has been happening in academia over the last decades, but we do wish to state that the time is ripe for increased awareness of the language of science, not only in cross-cultural psychology, but in other academic fields as well.

We believe that at the moment, psychology is entering a stage of increasing self-reflection and self-criticism (e.g., Pinker, 2014; Stroebe, 2016; Schmidt & Oh, 2016). One aspect that so far has been widely neglected in any discussion that focuses on reproducibility and statistical methods, but which nevertheless may be closely related, is the language of academic publications. We hope that our contribution will help to stimulate this debate by

shedding light on linguistic changes in academic publications over the last several decades. We are optimistic that the act of debating these issues in itself will help psychology to move forward and to master the challenges of science in the 21st century.

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Endnotes

[1] For a critique of using the Google Ngram corpus to make inferences about cultural developments in language, see Pechenick et al., 2015.

[2] Differences in degrees of freedom reflect the fact that a number of articles, particularly among the CCR articles, did not contain an abstract.

Tables

Table 1: Keyword analysis of linguistic differences between the JCCP and the CCR articles

	JCCP articles			CCR articles		
Nr.	Frequency	Keyness	Word	Frequency	Keyness	Word
1	33285	7.78	self	9583	9.74	societies
2	15869	6.14	chinese	1741	3.81	hraf[a]
3	22286	4.88	journal	2216	3.72	ethnographic
4	14299	4.26	participants	2540	3.20	anthropology
5	24978	3.93	differences	2940	3.03	sexual
6	9428	3.81	japanese	1527	2.94	warfare
7	9586	3.46	subjects	2912	2.84	acceptance
8	24212	3.42	group	1219	2.60	polygyny
9	15662	3.13	items	1208	2.17	files
10	9214	3.00	americans	2750	2.06	cases
11	26042	2.96	children	764	1.82	sccs[b]
12	6775	2.84	acculturation	1384	1.79	evolution
13	12537	2.74	personality	2265	1.77	marriage
14	57673	2.50	cultural	1552	1.75	labor
15	18430	2.50	values	1331	1.74	codes
16	25571	2.28	culture	1112	1.69	subsistence
17	10566	2.22	ethnic	1835	1.61	color
18	7905	2.13	item	691	1.59	autocorrelation
19	7710	1.90	english	5758	1.56	women
20	19978	1.86	american	834	1.56	ethnology
21	3867	1.84	hong	861	1.46	agriculture
22	13315	1.82	students	3067	1.46	political
23	12452	1.74	across	1134	1.38	kin
24	3449	1.64	kong	938	1.36	kinship
25	5508	1.63	performance	962	1.35	anthropologist

Note: AntConc v 3.4.4 (Anthony, 2005) was used for the analysis; in the table, functional words, author names, and other words and expressions without any obvious relation to contents of the journal were omitted; the complete list is available here https://osf.io/6unv4/; Frequency = Frequency of the word within the respective corpus; Keyness = log-likelihood-ratio of the word's statistical specificity for the respective corpus (cf. Kilgariff, 2001). a = Human Relations Area Files; b = Standard Cross-Cultural Sample.

Table 2: Keyword analysis for JCCP articles from the time periods 1970-1984, 1985-1999, and 2000-2014

	JCCP articles									
	1970-1984			1985-1999			2000-2014			
Nr.	Freq.	Key.	Word	Freq.	Key.	Word	Freq.	Key.	Word	
1	4612	3589.00	subjects	4278	1580.29	subjects	11900	11502.97	participants	
2	8033	1527.99	children	884	1437.76	television	17153	5231.27	we	
3	818	1167.58	perceptual	10618	1036.98	psychology	21818	4585.64	self	
4	1413	1155.42	mexican	10416	977.96	cross	12787	3870.57	values	
5	382	828.98	illusion	4955	937.69	students	8430	3580.45	model	
6	1274	812.32	subject	927	755.08	risk	2304	2432.01	parenting	
7	734	804.52	conservation	266	569.36	songs	8307	2036.72	across	
8	461	780.40	piaget	1628	552.92	triandis	2764	1993.26	fit	
9	792	773.23	modern	186	494.15	fitd	1812	1925.96	construal	
10	1517	773.08	males	323	461.56	mmpi	1793	1890.03	relational	
11	2477	754.05	sex	261	452.96	inuit	2353	1851.01	schwartz	
12	1463	746.40	white	3299	445.87	japanese	5349	1750.13	country	
13	358	696.13	pictorial	546	418.03	filipino	4718	1698.21	acculturation	
14	1178	689.29	indian	245	393.40	silence	841	1465.76	children	
15	394	632.77	modernity	427	373.89	hui	692	1436.32	nso	
16	1379	625.77	females	5602	359.69	university	748	1425.15	rmsea	
17	2197	616.52	responses	171	346.50	embarrassability	1069	1421.06	honor	
18	1379	625.77	females	426	341.29	attractiveness	1367	1411.58	invariance	
19	953	607.27	grade	282	338.40	safety	1445	1406.84	russian	
20	1046	598.51	black	400	335.20	etic	2213	1384.37	contexts	
21	3599	587.14	age	290	332.47	philippine	1257	1355.03	openness	
22	2517	568.08	school	441	324.10	emic	2130	1283.88	autonomy	
23	888	567.67	field	165	316.43	harassment	5108	1275.11	individuals	
24	500	557.43	color	288	300.67	nuclear	987	1255.58	relatedness	
25	686	557.10	chicano	364	287.50	disclosure	2518	1226.76	satisfaction	

Note: AntConc v 3.4.4 (Anthony, 2005) was used for the analysis; in the table, functional words, and other words and expressions without any obvious relation to contents of the journal were omitted; the complete list is available here https://osf.io/3yx69/; Freq. = Frequency of the word within the respective corpus; Key. = log-likelihood-ratio of the word's statistical specificity for the respective corpus (cf. Kilgarriff, 2001).

Table 3: Keyword analysis for CCR articles from the time periods 1970-1984, 1985-1999, and 2000-2014

|	CCR articles								
	1970-1984			1985-1999			2000-2014		
Nr.	Freq.	Key.	Word	Freq.	Key.	Word	Freq.	Key.	Word
1	1161	1147.40	naroll	1504	3172.75	moral	2421	1434.60	acceptance
2	633	1059.60	diffusion	1529	1057.56	murdock	1337	1397.50	adjustment
3	347	1031.87	shetland	349	927.27	kohlberg	912	804.74	paternal
4	1165	909.89	problem	530	759.86	subjects	2174	802.83	countries
5	858	806.64	warfare	263	707.67	cassava	1518	712.34	perceived
6	559	788.17	galton	299	672.81	famine	1979	698.80	parental
7	398	735.28	raoul	260	608.73	bone	813	650.12	maternal
8	244	725.58	orkney	500	608.56	justice	936	644.36	punishment
9	864	724.29	hraf[a]	412	590.28	homosexuality	470	636.55	corporal
10	707	716.13	paper	3544	589.30	social	1420	589.73	color
11	1387	689.68	test	337	570.95	envy	917	527.85	fathers
12	747	672.14	residence	3819	565.64	cross	1087	517.44	participants
13	1066	670.09	correlation	364	557.65	jealousy	1868	448.98	psychological
14	201	597.71	habs[b]	545	553.85	stage	466	436.56	barber
15	362	572.78	matrilocal	454	528.56	property	352	434.64	teen
16	216	554.45	cargo	5344	526.68	cultural	2653	395.50	self
17	999	554.36	ethnographic	556	491.22	roles	910	385.58	mothers
18	3143	547.05	societies	700	466.65	codes	1042	378.80	rohner
19	563	523.26	bias	324	456.30	reasoning	1648	378.70	national
20	199	505.81	film	201	448.33	deterrence	336	373.20	happiness
21	348	504.19	taboo	215	439.29	dwelling	387	372.47	trust
22	221	496.44	freud	3284	438.41	societies	264	370.53	khaleque
23	576	475.77	percent	184	437.72	starvation	258	362.11	inglehart
24	491	475.56	atlas	228	396.79	rape	1382	360.17	parents
25	170	462,68	misses	264	362.26	private	1139	344.58	country

Note: AntConc v 3.4.4 (Anthony, 2005) was used for the analysis; in the table, functional words, and other words and expressions without any obvious relation to contents of the journal were omitted; the complete list is available here https://osf.io/r6g4v/; Freq. = Frequency of the word within the respective corpus; Key. = log-likelihood-ratio of the word's statistical specificity for the respective corpus (cf. Kilgarriff, 2001). a = Human Relations Area Files; b = HRAF Automated Bibliographic System.

Figure 1. The relative frequency of positive and negative words, 1970-2014
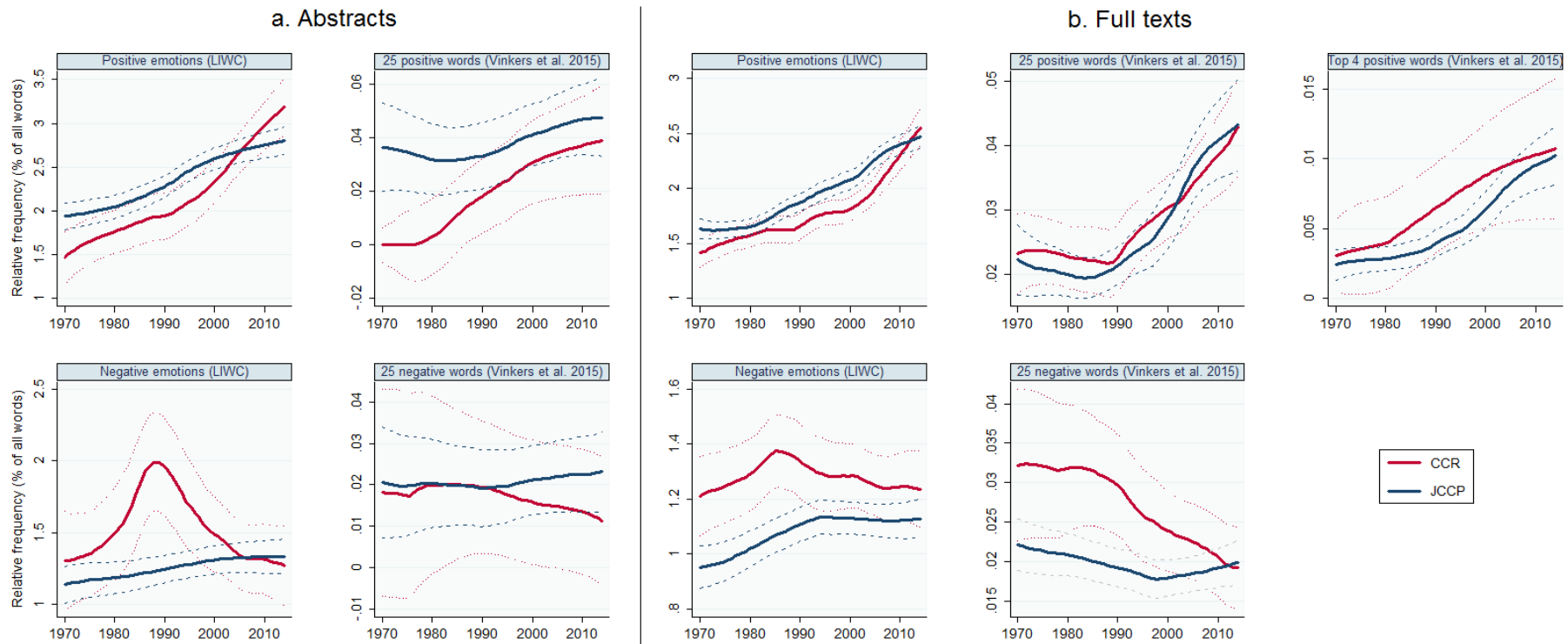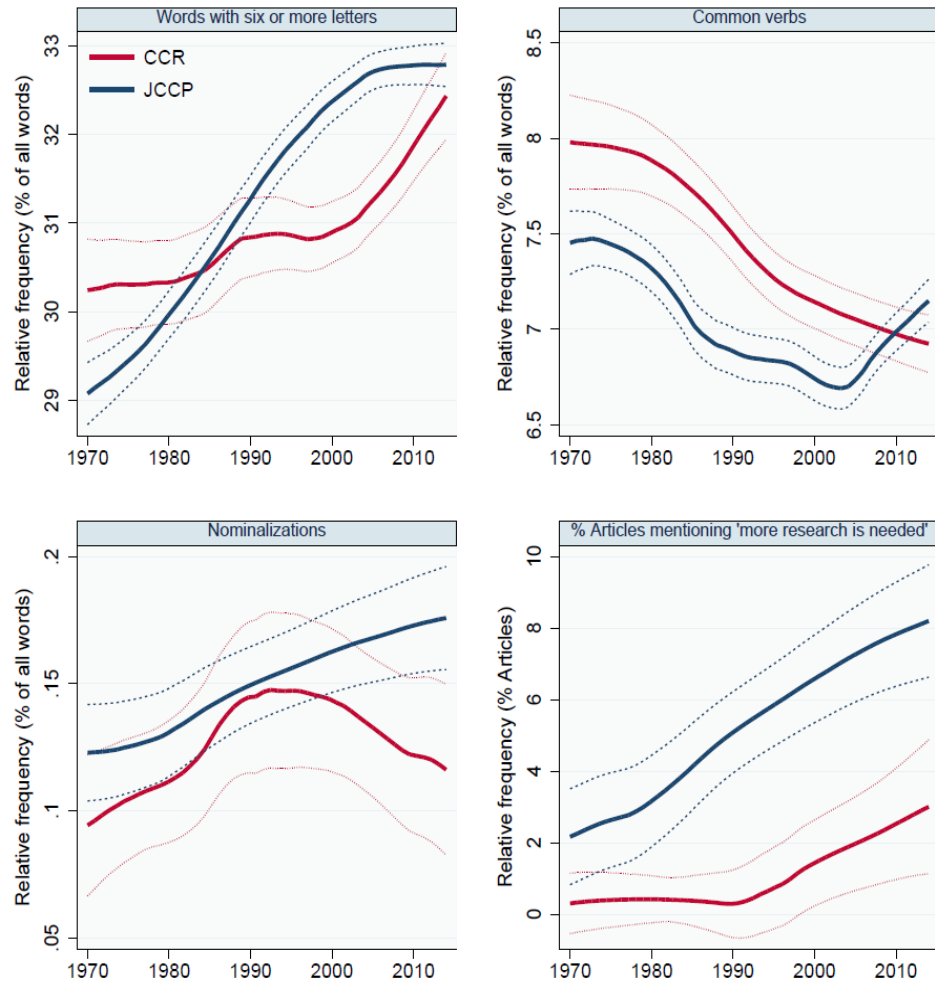

Note: CCR=Cross-Cultural Research, JCCP=Journal of Cross-Cultural Psychology, LIWC=Linguistic Inquiry and Word Count, dotted lines=95 percent confidence interval for CCR trend line, dashed lines=95 percent confidence interval for JCCP trend line. In Figure 1a, 17 JCCR texts as well as 150 CCR texts had to be excluded because they contained no abstracts.

Figure 2. The relative frequency of mentions of marginal significance, 1970-2014
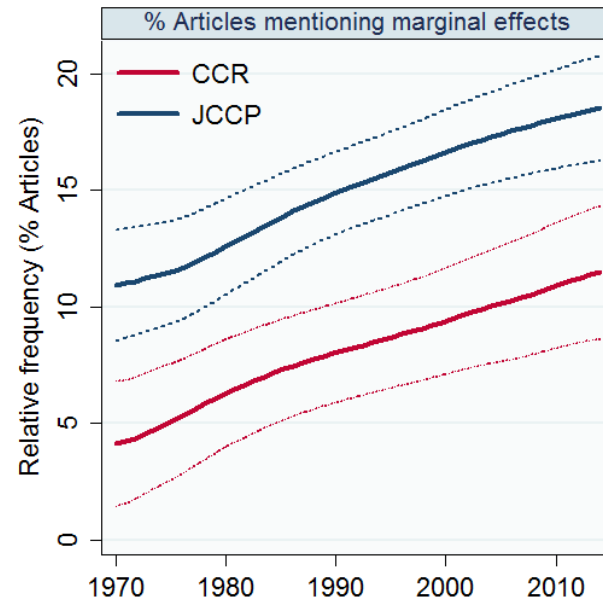
Note: Shows trend for full texts (without abstracts). CCR=Cross-Cultural Research, JCCP=Journal of Cross-Cultural Psychology, dotted lines=95 percent confidence interval for CCR trend line, dashed lines=95 percent confidence interval for JCCP trend line.

Figure 3. The relative frequency of long words, common verbs, nominalizations, and 'more research is needed', 1970-2014

Note: Shows trend for full texts (without abstracts). CCR=Cross-Cultural Research, JCCP=Journal of Cross-Cultural Psychology, dotted lines=95 percent confidence interval for CCR trend line, dashed lines=95 percent confidence interval for JCCP trend line.

Appendix

Table A1: Spearman's rank correlation between word scales and year

x	CCR	JCCP
Abstracts		
Positive emotions (LIWC)	0.3072***	0.1574***
25 positive words (Vinkers et al. 2015)	0.1516***	0.0482*
Negative emotions (LIWC)	- 0.0669	0.0518*
25 negative words (Vinkers et al. 2015)	0.0002	0.0418
Full texts		
Positive emotions (LIWC)	0.3550***	0.3105***
25 positive words (Vinkers et al. 2015)	0.2188***	0.2285***
Top 4 positive words (Vinkers et al. 2015)	0.2177***	0.2656***
Negative emotions (LIWC)	- 0.0396	0.0569*
25 negative words (Vinkers et al. 2015)	- 0.0410	- 0.0030
Marginal effects	0.1364***	0.1090***
'More research is needed'	0.1013**	0.1235***
Words with six or more letters	0.2292***	0.3944***
Common verbs	- 0.3186***	- 0.0830***
Nominalizations	0.0719	0.0482*

*Note: * p < .05, ** p < .01, *** p < .001*

Table A2a: Unpaired T-Tests comparing the mean of the first fifteen years (1970-1984) to the mean of the last fifteen years under study (2000-2014) in JCCP.

	1970-84			2000-14			Difference in means	t-statistic
	N	mean	SD	N	mean	SD		
Abstracts								
Positive emotions (LIWC)	483	1.907	1.758	749	2.874	2.525	0.967***	-7.35
25 positive words (Vinkers et al. 2015)	483	0.037	0.198	749	0.048	0.214	0.011	-0.93
Negative emotions (LIWC)	483	1.078	1.518	749	1.342	1.910	0.264*	-2.56
25 negative words (Vinkers et al. 2015)	483	0.022	0.158	749	0.023	0.131	0.001	-0.15
Full texts								
Positive emotions (LIWC)	480	1.646	0.810	745	2.386	1.236	0.740***	-11.61
25 positive words (Vinkers et al. 2015)	480	0.021	0.047	745	0.040	0.083	0.019***	-4.54
Top 4 positive words (Vinkers et al. 2015)	480	0.003	0.011	745	0.009	0.026	0.007***	-5.27
Negative emotions (LIWC)	480	0.953	0.785	745	1.113	0.938	0.160**	-3.11
25 negative words (Vinkers et al. 2015)	480	0.022	0.031	745	0.019	0.036	- 0.002	-1.31
Marginal effects	480	10.625	30.848	745	20.000	40.027	9.375***	-4.36
'More research is needed'	480	1.667	12.815	745	8.591	28.041	6.924***	-5.08
Words with six or more letters	480	29.545	3.096	745	32.756	2.812	3.211***	-18.74
Common verbs	480	7.386	1.313	745	6.933	1.285	- 0.454***	-5.98
Nominalizations	480	0.118	0.203	745	0.186	0.365	0.068***	-3.74

Note: SD=standard deviation; * $p < .05$, ** $p < .01$, *** $p < .001$

Table A2b: Unpaired T-Tests comparing the mean of the first fifteen years (1970-1984) to the mean of the last fifteen years under study (2000-2014) in CCR.

	1970-84			2000-14			Difference in means	t-statistic
	N	mean	SD	N	mean	SD		
Abstracts								
Positive emotions (LIWC)	157	1.689	1.708	271	2.881	2.273	1.192***	-5.7
25 positive words (Vinkers et al. 2015)	157	0.000	0.000	271	0.040	0.187	0.040**	-2.68
Negative emotions (LIWC)	157	1.374	1.812	271	1.329	1.970	- 0.045	-0.23
25 negative words (Vinkers et al. 2015)	157	0.020	0.141	271	0.012	0.089	- 0.008	-0.67
Full texts								
Positive emotions (LIWC)	217	1.548	0.791	272	2.159	1.079	0.612***	-6.98
25 positive words (Vinkers et al. 2015)	217	0.023	0.039	272	0.038	0.051	0.015***	-3.52
Top 4 positive words (Vinkers et al. 2015)	217	0.003	0.013	272	0.012	0.059	0.009*	-2.14
Negative emotions (LIWC)	217	1.243	0.957	272	1.246	1.061	0.003	-0.03
25 negative words (Vinkers et al. 2015)	217	0.033	0.073	272	0.019	0.027	- 0.014**	-2.85
Marginal effects	217	3.687	18.887	272	14.706	35.482	11.019***	-4.13
'More research is needed'	217	0.461	6.788	272	2.574	15.864	2.113	-1.83
Words with six or more letters	217	30.281	3.683	272	31.594	3.414	1.312***	-4.08
Common verbs	217	7.951	1.996	272	6.906	1.354	- 1.045***	-6.88
Nominalizations	217	0.108	0.184	272	0.123	0.245	0.015	-0.75

Note: SD=standard deviation; * $p < .05$, ** $p < .01$, *** $p < .001$