Graphic Reading: Text Visualization by Means of Information Design

(Journal Article + Infographic)

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In this paper, text visualizations are used to analyse the acceptance speech given by Barack Obama at the Democratic Convention on 28 August 2008. Five information graphics visualize syntax and pragmatic elements: The visual comparison of words or text fragments provides details about text structure, writing style and content. By filtering, mapping and translating text into graphical structures, large amounts of information can be concentrated into a small space, thereby allowing us to grasp overall structural elements at a glance. This is why text visualizations can be useful as an additional method for analysing a text or a text corpus. Furthermore, the quality of an information graphic is to transform facts into communication in a quick, compact way. The study of the sign process points out the significance of graphic design abilities using type, space, image and colour to layout information. These different modes of communication work together to convey meaning. Therefore, this contribution is a practical introduction to the development of text visualization, based on the approach of *research through design*.

This contribution comprises a number of *infographics* which appear in the appendix.

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1. Introduction

This article develops a method for visualizing text called *graphic reading*.[1] The *raw material* is the acceptance speech of Barack Obama. Our method visualizes data such as punctuation, keywords and sentence length and assists in interpreting the content of a text by depicting text strategies, figures of speech, patterns and regularities (or irregularities). By the use of six visualization methods (see Figures 1–5 in the Appendix), five developmental stages are introduced in each case: Data set, data collection, data architecture, data design, graph description/specification.

The graphics[2] depict an abstract overview of a text (or a corpus of texts) and allow literary science and communication studies to discern its setting. Knowledge visualizations have the advantage of concentrating large amounts of information in a small space and therefore allow us to grasp a structure at a single glance. Compact overviews display several variables in a single, two-dimensional image. Yet the possibility of using information graphics as instruments for data analysis is not widely known. Focusing on graphic examples, this work aims to close this gap and demonstrate the potential of visualization methods in the context of linguistic tasks. Such visualization techniques serve to analyse linguistic data, help create new perspectives on the material, and hence help improve our understanding of texts. This alternative visual method provides new insights and helps us to develop new research questions.

With the help of deictic pictures, complex data is compressed and arranged in a manageable fashion, allowing facts and relationships to be represented and transmitted clearly. By picturing texts and text corpora, literary studies can handle big data. Yet the ever-growing amount of data has changed how we think in the humanities. A new discipline has emerged, the digital humanities. When literature is not just randomly examined, but our focus is detached from specific

[1] The graphic development method demonstrated here in the context of text analysis is derived from the notions of *close and distant reading* as used in literary studies. Comparative literature uses quantitative diagrams to compare texts. This purpose of *distant reading* (Moretti 2007, 2013) is a visual method to overview a corpus of texts. Graphs, maps and trees are the common quantitative approach to literature.

[2] The terms graphic, information graphic, visualization and knowledge visualization are used as synonyms at present. To differentiate between them would be beyond the scope of this article. We here follow the terminology of Remo Burkhard (2005: 238–255).

examples, this can lead to new vistas on literature, working methods and publication strategies of authors and orators. The present study offers an example of this approach, and hopefully will stimulate further evaluations of works using graphical reading methods.

Design Research

Linguists (Lubrich 2011; Piatti 2012), communication scientists (Sauer 2004; Weber 2007, 2008) and information and computer scientists (Koller & Seinweber 2007; Gelbukh 2015) are all working on quantitative text analysis. Even some communication designers (Geiger 2004; Posavec 2006; Späth & Rembold 2007; Pyper 2009) aim to write without words. This shows that data visualization is either a theoretical, technical subject or more of an artistic approach. Communication design abilities – including visual perception, semiotics and knowledge about typography or layout – have not yet been a topic of scholarly discourse.

This is why this article demonstrates how text can be visualized by explorative visual methods. The focus of this project-based research is on the intersection of communication design and information design. This means that this paper is written from the perspective of research through design (Frayling 1993; Findeli 2004; Jonas 2006). It shows the advantage of the insights gained throughout design practice to provide a better understanding of complex problems.

In particular, the communication process applied during the development of the information structure is subject to detailed explanations from a communication design point of view. Fundamental principles of analytical design during the creation process (Tufte 2006: 122-139) are applied to the transcript of Obama's speech. The paradigm *research through design* (Jonas 2004: 26) follows practice-based design principles.

Iconic Turn

The *iconic turn* has greatly contributed to adding new, specific performance features to an image, characterizing it as both communication medium and information carrier. In analogy to the *linguistic turn*, the *iconic turn* was described by Gottfried Boehm in the 1990s (Boehm 1994, 1999) and underlines the paradigm shift brought about by mass media. This new way of thinking, turning our attention to visualization in the sciences, demonstrates what previously had remained invisible. This consciousness of mental imagery is already found in the phenomenological media theory developed by Ferdinand Fellmann, who introduced the term *image turn*. Fellmann describes the autonomic, symbolic form between sign and language as "symbolic pragmatism" (Fellmann 1991). A few years later, Thomas Mitchell became involved with the shift from the linguistic turn to the image turn. Mitchell describes the "postlinguistic, postsemiotic rediscovery of the picture as a complex interplay between visuality, apparatus, institutions, discourse, bodies, and figurality" as the *pictorial turn* (Mitchell 1994: 16).

The tradition of non-linguistic symbol systems can be traced early on in Charles Peirce's semiotics and in Nelson Goodman's "pictorial representation as a mode of signification" (Goodman 1976: 3). While they were situated in the Anglo-American realm, it was Roland Barthes who was of similar significance in the European tradition (Barthes 1980).[3] The origins of the *visual turn*

[3] *Segmentation* is an operational principle of Barthes (Barthes 1980: 229) that is used in text analysis. This

lie in cultural studies and it has lately been influenced by the *new media*. Images are equally accepted as sources alongside texts (Janser 2005: 5) and also provide the possibility of acquiring knowledge (Haas 2006).

Raw Data

These visualization methods are explained here by using the example of Barack Obama's acceptance speech, given on 28 August 2008 before a crowd of 84,000 following his nomination as the Democratic presidential candidate. More than 38 million people across ten U.S. cable and broadcast TV networks tuned in during prime time to follow this 42-minute speech (Obama 2008a). That same day, the *New York Times* published a transcript of it online. This speech (Obama 2008b) and its transcript (Obama 2008c)[4] serve here as the basis for our explorative visual investigation.

linguistic method of splitting, arranging and classifying by means of specific criteria is used again in the method of *graphic reading*. If the language is seen as a system of symbols, the epistemic value of pictures is a logical consequence. This linguistic theory of pictures is founded on methods of structuralist semiotics, which is itself based on Saussure's sign system.

[4] This transcription differs in several places from the video transcript.

Visualization Goals

Information design assists human perception in comprehending large-scale information through data-transformation and compression. Having a compact overview allows information to be grasped more quickly and in a more coherent fashion.

In a very general résumé, visualizations have three goals:

1. **Analysis:** Explorative research on visualizations (Schumann & Müller 2000: 5) starts with raw, unsorted data. Using these images allows us to embark on an unstructured search for information and patterns, to establish hypotheses and, as Plaisant has put it, to answer questions that have not been posed before (Plaisant 2004). These knowledge pictures serve to extract data and make new discoveries (McCandless 2009).
2. **Verification:** A confirmatory analysis uses graphics to verify facts. The procedures for establishing the visualizations support the evaluation of data and help us understand it better (Chen 2003: 35).
3. **Communication:** The third goal of visualization is mediation. Researchers use the images in their arguments and to explain complex insights to a non-specialist audience, for example in a museum or a newspaper.

The text visualization shows this range of operating modes and demonstrates the epistemological revaluation of the image. Knowledge visualizations – even with the goal of communication – are more than illustrations alongside a text. They are a form of picturing named *operative picturing* (Krämer 2009) that belongs to the fields of *useful images* (Boehm 2001) and *utilitary images* (Majetschak 2005). Among these, certainly in a simplified construct of text and image, are the text visualizations because "a written text […] involves more than language: it is written *on* something […] and it is written *with* something" (Kress & van Leeuwen 1996: 39). This multimodal approach (Hiippalla 2015: 155–159) attributes deictic properties to the image.

The operative character (Krämer 2009), i.e. the properties of diagrammatical image shapes, demonstrates the knowledge pictures at present.

Procedures

Designing an information graphic is a highly iterative process consisting of sketching, visualizing and evaluating. In a first step, the data needs to be extracted from the raw material so that it might be evaluated statistically in visual terms. In our example of Obama's speech, this means that words, phrases and punctuation marks have to be counted, and timeslots for talking and clapping have to be recorded.

Then, an appropriate information architecture (Burkhard 2008) is determined, and only in the final step is the knowledge picture structured graphically and typographically to form a visual representation. To generate a graphical output, a vector graphics editor is used. Standard chart and statistics programs can often hinder us in exploring, structuring and classifying data such as the words, phrases and punctuation marks.

The appearance of the graphic is derived from its function and its purpose. The paradigm of functionalism *form follows function*, when translated into data visualization leads us to *form follows content* (Weber 2008: 194). Similarly, a reduction to the essentials can be applied to information design. The information design researcher Edward Tufte writes of "chart junk" in this context (Tufte 2001: 116), referring to the visual elements of a graphic that do not contribute to a better understanding, or might even distract the reader.[5]

2. Visualization Methods

2.1 Obama vs. the Audience

Pie chart (Figure 1 in the Appendix)

A video recording of Obama's speech serves as the source for the following pie chart. First, it is useful to watch the footage carefully, without any concrete questions or communication purpose in mind.[6] At this point any interdisciplinary considerations involving design or linguistic research are of secondary importance.

1. Data set: The roaring applause of 84,000 spectators right at the beginning when the senator arrives on the stage is highly impressive. Throughout his speech Obama is regularly interrupted by applause. This dialogue with the audience is an integral part of his speech and therefore lies in the main focus of our initial graphical investigation. In order to focus on the design process, we here formulate a specific question which can later be answered graphically: what is the relationship between Obama's active speech time taken up by the audience's reactions?

2. Data collection: Data for the first visualization is acquired by using a stopwatch in order to measure the speech and reaction times. Interestingly, the audience reaction does not only consist of applause but in two cases also of boo-cries, and in one case even of laughter. This statistical evaluation, considered as raw data in the context of visualizations, can now be put into graphical form.

3. Data architecture: Determining the distribution of time proportions between Obama and the public during the whole TV appearance helps us find a suitable form for the graphic. Our choice of a pie chart depicts the result in a two-dimensional, striking manner. Approximately one third of

[5] As in the paradigm "form follows function", this does not mean rejecting decorative or symbolic elements as long as these also fulfil a certain function.

[6] In contrast to information graphics, an explorative analysis does not start with the material being interpreted. There, the collaboration between designer and linguist is inevitable during the iterative design process.

Obama's public appearance on stage is taken up by audience reactions.

We see that the pie chart is ideally suited to this examination, as only four partitions (Obama: 1. Speech, Audience: 2. Applause, 3. Boos, 4. Laughter) need to be presented. However, once there is a large amount of slices, the chart becomes unsuitable. If the slices become very small, the eye can't differentiate their values any more. Zero or negative values cannot be visualized. Comparing more than one speech would be difficult because pie charts would have to be juxtaposed and cannot be superimposed.

But this "poor" method is suitable for this specific display of information, and achieves our goal of answering our initial question about his "presence" during this public appearance.

4. Data design: Current statistical programs limit design possibilities by allowing us only to choose from a number of defined colour sets. In order to acquire relevance for our argument we need to design such deictic images. Figure 1 illustrates this by turning the circle (which is an unusual step), placing Obama's active speech time on top of the audience time. The two 'slices' are contrasted further. The circle becomes a ring, leaving space in its centre to accommodate information regarding the total time. Such a compact form can easily be understood at one glance.

Particularly in a political context, the choice of colour has to be made with the utmost of care. The choice of the slide colour is data driven. The laughing audience is painted in yellow, the negative reaction of booing is painted in brown. This allows for a strong visual contrast with the black slice that signifies the actual speech, and clearly delineates the different audience reactions (in different colours) from the monochrome black of the speech. The content here defines the form. Often, however, graphics are part of a larger visual identity in which the choice of colour is predetermined. In this case, the choice of colours should be minimized. One colour to highlight outstanding facts is recommended. Common colour-coded ranking systems (such as the traffic light logic of green and red) are good tools for direct, clear communication. Specific cultures have to be considered when choosing colours. Data may also be differentiated by means of other attributes, which Jacques Bertin has called visual variables – such as different shadings or textures (Bertin 1967: 50). These variables are useful alternatives to different colours because scientific publications – for financial reasons – are still often printed in black and white.

In both scenarios it is important that no colour or shading stands out visually, as this would falsify the overall picture and might enable it to be declared as "chart junk" and thereby reduce the reliability of the study.

One final visual principle (Tufte 2006) can add credibility to our simple chart, namely its annotation. Not just a caption (including percentiles), but also information on the sources and authors serve as elements of quality control. These, too, are part of the graphic and have to be laid out carefully. Choosing the font, size and position underlines the statements made by the graphic. A circular form is ideally suited for placing the text in its centre, leaving the upper and lower captions to emphasize the opposing poles: Obama vs. the audience interaction.

The graphic design – the layout, reference grid and typography – reinforces the structural design, thereby allowing the visualization to gain in impact and legibility. And by using criteria such as contrast, disposition, structure, proportion, micro-typography and iconography, the graphic design emphasises the storytelling.

2.2 Audience Emotions

Bar chart (Figure 2 in the Appendix)

The visualization above shows that Obama is frequently interrupted by applause throughout the speech, and, briefly, by boos and laughter, too. The following graphic takes up these affective moments to cast a spotlight on what statements provoke such an emotional reaction. The question here is therefore: When is Obama interrupted, and what statements trigger these reactions?

1. Data set: To answer these questions we need a transcript of the speech.

2. Data collection: Correlating the speech time with the transcript highlights the interruptions made by the public, similar to a map. The duration of the interruptions is irrelevant for our purposes here.

3. Data architecture: The text's total of 4,572 words is fitted into one narrow text block. A very long, thin bar is the result. In conjunction with the audio file, the continuous text is split visually at the very moment that Obama is interrupted by the audience. By changing the scale of detail using the principle "overview first, zoom and filter, then details-on-demand" (Shneiderman 1996: 336), it is possible to extract patterns, clusters, rule sets and, in the present case, the rhythms between speech and moments of pause. Other non-relevant information is filtered out ("filter out uninteresting items," Shneiderman 1996: 336).

4. Data design: Obama and the audience are represented in two stacked bar charts (Figure 2a). The black column represents timeslots of Obama, the coloured column shows the reaction of the audience. The two bars are placed side by side to show the interaction between speaker and audience, but they are laid out separately to show the white spaces representing the breaks.

5. Graphic description: By condensing the text and by means of abstraction (here: the blackening of the font), we can observe that there were only four long passages in the speech. The length of the space in between two black bars represents the interruption time.

This visualization allows us also to see that during the 42 minutes of the speech, Obama has to pause only once due to laughter (Figure 2b) and three times due to boos (Figure 2c). All four moments occur in the first third of his speech. Having mapped the relative occurrence of the audience reactions, our focus is now on these specific acts of speech, meaning that we zoom in on a particular passage of the bar chart. Again, with this quantitative visualization method, we capture only information groups such as long word clusters. While an in-depth linguistic analysis would extend beyond the scope of this article, our approach here is that of an initial *close reading* to support the aim of the visualization.

6. Graphic analysis: By reading the phrase of Obama, just before the audience is laughing, it becomes clear that the audience does not laugh at Obama but is instead amused by his remarks about his Republican opponent, Senator John McCain. The ironic phrase "Now, I don't believe that Senator McCain doesn't care what's going on in the lives of Americans; I just think he doesn't know" is the cause of the audience reaction.

Similarly, boos are not directed towards himself but refer instead to Obama's adversaries McCain or George W. Bush. What the visualization shows is the cause and effect between the two entities: Obama and the audience. By highlighting the effects, the cause can be analysed in detail by linguists or communication scientists.

2.3 Text Rhythms

Histogram (Figure 3 in the Appendix)

1. Data set: The 216 sentences are separated by punctuation marks.

2. Data collection: The sentence length is defined by counting words and letters.
Our questions here are as follows:

- What is the rhythm of a professional speaker such as Barack Obama? Is it possible to perceive irregularities or clusters, and does the length of sentences change according to these?
- What is the length of Obama's sentences? Does he generally use short or long sentences, and what is his average sentence length?

3. Data architecture: The first step is to split up the text like links in a chain and set them next to each other. Each sentence is then replaced with a black bar. This increases the contrast between black and white spaces and also reduces the risk of being distracted by the actual content of the sentences.

4. Data design: Visualizing (Figure 3a) the rhythm of the text requires the bars to be turned by 90 degrees and arranged on a horizontal axis. Thus the longest and the shortest sentences are emphasized. In a second diagram (Figure 3b), the sentences are sorted from left to right according to their length and again arranged along an axis. The longest sentence, containing 70 words, is positioned at the beginning, and the shortest, with 2 words, at the end. Both diagrams show how identical raw data can answer different questions by being presented differently.

Changing the bar chart spatially allows it to be adapted to answer expanded questions. Sybille Krämer sees potential in the spatial expansion of diagrams and defines an "ordering principle" (Ordnungsprinzip) (Krämer 2009: 96). Jacques Bertin discusses both dimensions of a plane, where a visible spot (in this example the bars) forms a relationship between two sets of values (x, y coordinates) and possesses a certain expansion (Bertin 1967: 50).

5. Graphic description: Both charts can be used as analysis tools for comparative purposes when examining speech genres, and can be utilised to contrast and compare festive speeches from different eras. Moreover, this form is well suited for the visualization of rhetorical figures. By applying the same visualization approach, it is possible to illustrate speech rhythms (including pauses), or to picture syntactical patterns or repetitions. It is useful to compare multiple variables in order to gain new findings from statistical data and to observe regularities (Bertin 1967: 50).

2.4 Punctuation

Bubble chart (Figure 4, Appendix)

1. Data set: Now that we have looked at sentence length, the tonality of the text will be examined by means of its final punctuation marks. This visualization shows the moments where Obama's speech tends to be interrogative, questioning, insistent, emphatic or – judging by the punctuation – neutral.

2. Data collection: Full stops, question marks and exclamation marks are filtered out here and arranged next to each other. The actual punctuation count shows that the transcription does not contain any exclamation marks. It remains unclear whether the Senator truly did not use any imperative sentences, or, if he did, why the transcript published by the *New York Times* does not contain any. On the

other hand, the ratio of full stops to question marks within the 216 sentences is 206 to 10. Nearly 5% of all sentences are thus interrogative. But none of the questions can be attributed to a specific interrogative type, as they tend to be indirect affirmations. The moments when Obama raises rhetorical questions in his speech will now be visualized.

3. Data architecture: As before, this visualization starts from the principle of "form follows data", by differentiating both types of punctuation and by emphasizing the question marks visually. The question marks are located in the chronology of the speech. Here, the 42-minute speech defines the base layer onto which all 216 punctuation signs are mapped.

If it had not been for this rigid framework, our graphic would resemble a long snake. The rectangular paper limits the graphic's space. One major drawback is that the line-by-line listing of punctuation creates contact points where there are none in reality. These points need to be excluded from consideration. An advantage of limited space, however, lies within the eye's ability to grasp all data at a single glance and to comprehend visual information quickly.

4. Data design: The full stop is represented as a dot, the question mark keeps the shape of a question mark. It is only a small step from punctuation to iconic symbols. So the eye very quickly recognises the symbol "question mark" as such, and the content becomes form. The analogy of the symbol is also reused in the specific amount of dots and question marks. Based on the Vienna method of visual statistics *(Bildstatistik)* of Otto Neurath's Isotype (International System of Typographic Picture Education), each symbol represents a quantity: One dot equals one full stop. In this manner, the relations can be read more easily and exactly.

To contrast questions and answers, both graphics are supplied with the same architecture, with identical grids and an identical design. The dichotomy of the images allows us to compare them.[7] Unlike in other graphics, detailed information – such as the text source – is also mapped here. Questions and answers are given in a small font in a narrow column at the corresponding position in the speech. The shape of the text block becomes a bar. When one compares the length of the questions – in other words the height of the bars – the result is a bar chart.

The answer to question nine stretches out over multiple sentences and is very long compared to the other answers. This spike is visually accentuated by reaching out over the margins of the paper.

5. Graphic description: Obama places nine out of ten questions in the first third of his speech. There are no questions in the second half. The graphic shows that the Senator uses only a short time slot to ask most of his rhetorical questions. One cluster consists of three consecutive questioning sentences (Nos. 3–5). These rhetorical sentences contain another rhetorical figure: The "repetitio". Here, "else" is repeated multiple times. Another figure can be observed at the beginning of the three sentences: The "parallel-

[7] André Malreaux's imaginary museum and Aby Warburg's Mnemosyne Atlas demonstrate clearly by means of photographs how image constellations and close pictures can generate knowledge. Franco Moretti's method of "distant reading" justifies the added value of a larger context as follows: "All you can see are swarms of hybrids and oddities, for which the categories of literary taxonomy offer very little help. It's fascinating, to feel so lost in a universe one didn't even know existed". The comparatist is against individual work with texts and instead recommends counting and mapping. Quantitative literary analysis is an excellent example of how to look at data from another perspective, using alternative methods.

ism". All beginnings are identical, starting with the question word, followed by "else", then a verb of possibility (would, could), then the subject "he" and finally an infinitive. Therefore, these three rhetorical questions are necessarily linked. Another cluster can be found in questions 6–8. Here, the main interest lies in the rhythm, as the rhetorical questions contain three words. All three questions have a different content, yet aim at the same answer. Questions 9 and 10 belong together, also due to contextual considerations: in questions 1–8 (thus in 80% of all questions) Obama is talking about McCain and the Republicans, describing the momentary situation, whereas in questions 9 and 10, the topic is different. In these last subjects raised, there is more of a vista of the future, more hope. These are the only questions that are immediately followed by an informative answer.

These conclusions are only feasible because the visualization contains various modes of information to describe time, place and type of questions. Edward Tufte called the complete integration of words, numbers, pictures, diagrams, graphics, charts, tables as the principle called "Integration of Evidence" (Tufte 2006: 131). This principle can be adopted in linguistics: The concept of multimodality (in documents) (Hiippalla 2015) argues that language, image, layout, and other modes of communication work together to convey meaning. The navigation structure of the bubble chart (Figure 4) with its explicit pointers, legends and entries is used to connect the output of different semiotic modes.

2.5 Content Analysis

Word cloud (Figure 5 in the Appendix)

The example demonstrates how a single, specific question can generate a set of findings. Does Obama talk about his opponent? If so, at what particular point does he do so?

1. Data set: In order to answer these questions, all topics of the speech must be filtered and laid out. To start with, the occurrence of every single word is determined.

2. Data collection: This can be achieved by using a common table (as here) or a word cloud. In order to gain insight into Obama's topics, the word cloud generator is set to count exclusively the nouns he uses.

3. Data architecture: The 20 most prominent words are pictured here in different font sizes, depending on their frequency ranking. Notions such as *America* and *American* or *work* and *workers* are correlated by hand.

4. Data design: The resulting word cloud is then recrafted from a graphical and typographical perspective. To increase readability, the concepts are ordered according to their frequency. To ensure that the different word lengths do not influence the visual impact, all words are underlined with a black bar, which turns the word cloud into a bar chart or histogram. To emphasize the contrast between the black bars and the white typography and to increase the visual impact, the font is set to bold. Since all the graphics are to be published, it is very important to achieve a unified visual language. A corporate identity is defined through its font,[8] by a reduction in the deployment of colours and by strict geometric forms.[9]

[8] The contemporary sans-serif grotesque font with neutral width, designed in 2010 by the Swiss typographer François Rappo, corresponds to these requirements.

[9] The visual language is characterized by an international style and is based on the principles of the modern architecture of the 1920s. The aesthetic of

Besides the visual representation through font size, the frequency of nouns is noted numerically next to each term. This figure serves only to verify the data and has no significance for the visualization.

5. Graphic description: Applying this method to Obama's speech, we find that the following nouns occur most often: *America/American* (54 times), *promise* (32 times), *work/workers* (28 times) and *McCain* (20 times). This answers the question posed earlier: Yes, Obama does talk about his Republican opponent, and also about President George W. *Bush* (8 times).

Word Map (Figures 6a–6c)

The word map (Figure 6) is based on the output of the previous word cloud (Figure 5).

1. Data set: The transcript is the basis of the visualization and the five most frequently used words are defined by the word cloud.

2. Data collection: The base layer on which these words are mapped is the transcription, which is laid out in a rectangular block (Figure 6a).

3. Data architecture: Sentence after sentence is strung together without recording paragraphs or other interruptions. It is important that this text is set on a single page. In the present example this means the font has to be very small (3.75 pt).

4. Data design: The font size and the line spacing are then configured so as to arrange the whole text block in an optimal manner. Visual separation can be achieved by marking the chosen words with coloured bars and by placing the rest on a black background (Figure 6a). Easily distinguishable colours are needed so that the words can be properly differentiated. However, to avoid any single word standing out, the colours also have to be balanced carefully. Then the complete text is deleted. In order to differentiate the chosen single words better, they are mapped onto separate layers (Figure 6b). Since the opening question concerned Obama's opponents, all mentions of both Republicans, McCain and Bush, have been identified and grouped together, thereby creating a group theme. Nevertheless, these two men are still differentiated visually (McCain: yellow, Bush: Red).

This approach of colouring text by differentiating words using colours has already been applied by Wibke Weber amongst others (Weber 2007). Defining word classes such as nouns, verbs, adjectives etc. and assigning them specific colours allows us to deduce the genre of the text or the writing style. But in order to recognize these patterns and colour tendencies, it is necessary to pay particular consideration to how the data is arranged. The manner of display and the size of the coloured words are therefore essential (Figure 6c). Testing different data arrangements, including architecture and design, is necessary to achieve the optimal result. Also in this case study, the visual variables of Bertin (1967) are taken as an example for explorative design research, using the method of parallel prototyping (Dow et al. 2010).

5. Graphic description: We can see from these images, for example, that the words *America* and *Americans* are distributed regularly throughout the speech, while promises are given in groups, and Obama's opponents are not addressed at the end.

the graphics is minimalistic and functional, renouncing the use of decorative elements. Regular geometric elements as well as standardized sizes are characteristics of the design. The simplistic language of modern minimalism tends to an extreme aesthetic reduction for design purposes.

3. Outlook

This study demonstrates by what graphical means a text can be analysed. Above and beyond the aspects investigated here, new perspectives can be opened up. Further investigations – using the approach of close and distant reading – could answer the following questions: What topics or vocabulary has Obama used during his mandate, from 2008 to the present day, and are these similar to those of previous presidents? In what kind of speech, for what target audience, where in the world and with what frequency does Obama talk about certain topics? Are the text structure, the sentence length, the dramaturgy or the rhetorical stylistic devices connected to US stock prices or even to the US fear barometer?

Through these alternative perspectives, scholars of linguistics, media and history can achieve interpretations that would be impossible by conventional readings.

4. Summary

One single audio file and its transcript served as the starting point for the development of a series of text visualizations. The selections made from the raw data – using phrases and text-fragments in correlation to time, numbers and size, as well as data architecture and design – are focused on their respective cognitive interest. The information graphics answer specific research questions and reveal a significant epistemic function.

These knowledge visualizations show how an alternative visual method of analysis can generate new forms of evidence. This method – called *graphic reading* – allows large amounts of data to be displayed in a small space for comparative purposes. Transforming text into image enables us to observe multimodality.

This paper is intended as a kind of methodological handbook for data visualization, offering not a theoretical approach but a practical contribution to how one might realize information graphics using text as their primary material. It allows us to perceive that deictic images may be used more often as a tool of argumentation, not just as pictorial supplements to a written paper.

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Appendix

Fig. 1

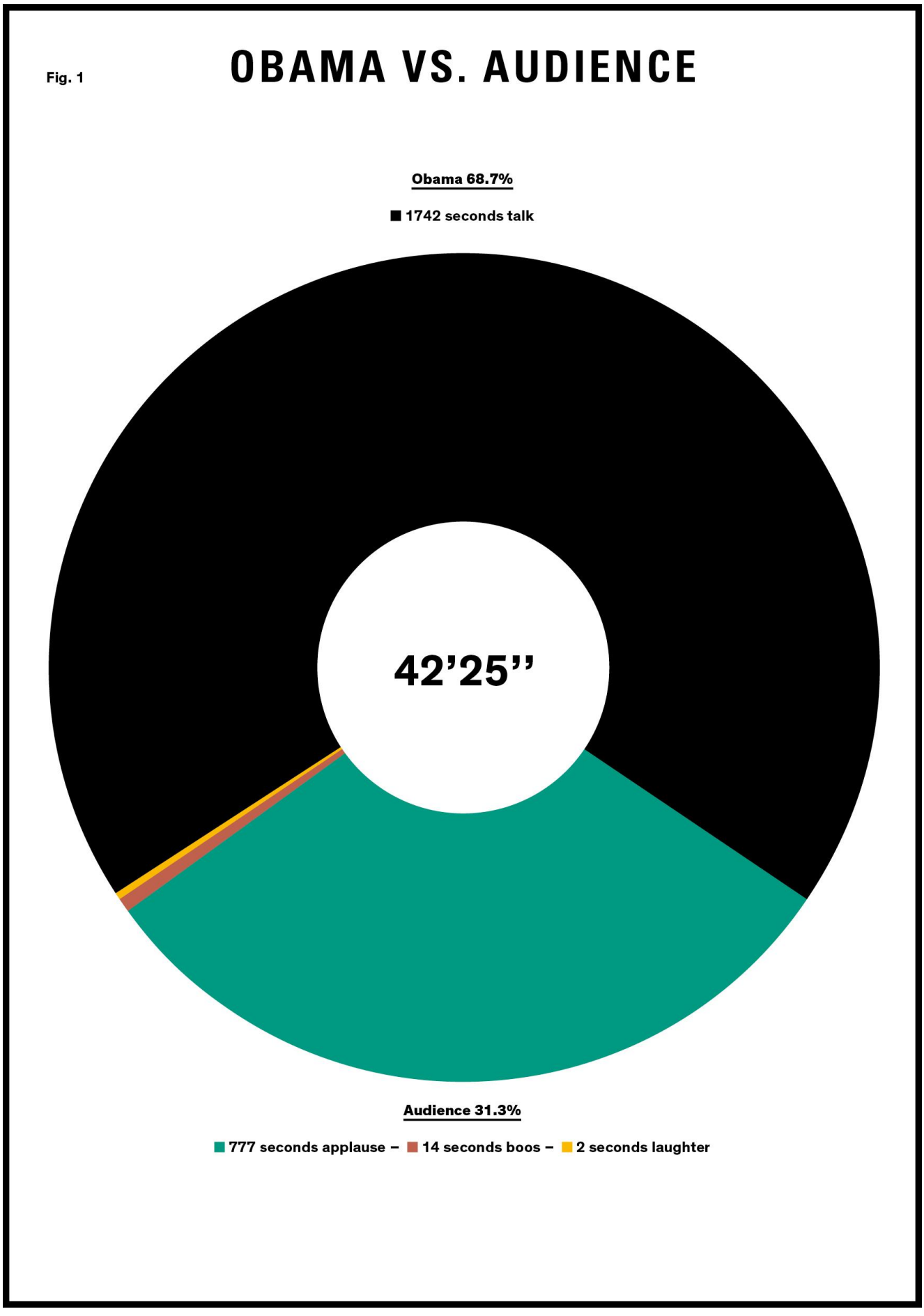
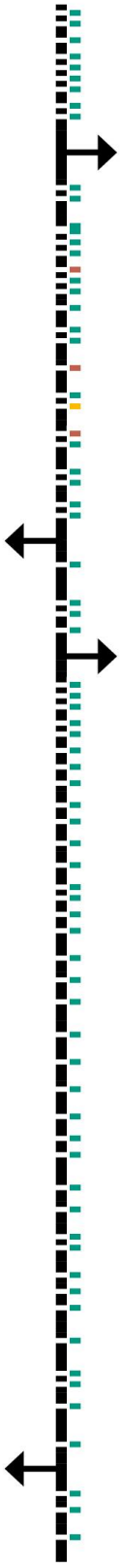


Fig. 2a

TIMESLOTS

4 uninterrupted slots allotted for talking



We measure the strength of our **economy** not by the number of billionaires we have or the profits of the Fortune 500, but by whether someone with a good idea can take a risk and start a new **business**, or whether the waitress who lives on tips can take a day off and look after a sick kid without losing her job, an economy that honors the dignity of work. The fundamentals we use to measure economic strength are whether we are living up to that fundamental promise that has made this country great, a promise that is the only reason I am standing here tonight. Because, in the faces of those young veterans who come back from Iraq and **Afghanistan**, I see my grandfather, who signed up after **Pearl Harbor**, marched in Patton's army, and was rewarded by a grateful nation with the chance to go to college on the G.I. Bill. In the face of that young student, who sleeps just three hours before working the night shift, I think about my mom, who raised my sister and me on her own while she worked and earned her degree, who once turned to food stamps, but was still able to send us to the **best schools** in the country with the help of **student** loans and scholarships.

I've seen it in the **workers** who would rather cut their hours back a day, even though they can't afford it, than see their friends lose their jobs; in the soldiers who reenlist after losing a limb; in the good neighbors who take a stranger in when a hurricane strikes and the floodwaters rise. You know, this country of ours has more wealth than any nation, but that's not what makes us rich. We have the most powerful military on Earth, but that's not what makes us strong. Our **universities** and our **culture** are the envy of the world, but that's not what keeps the world coming to our shores. Instead, it is that American spirit, that **American promise**, that pushes us forward even when the path is uncertain; that binds us together in spite of our differences; that makes us fix our eye not on what is seen, but what is unseen, that better place around the bend. That promise is our greatest inheritance. It's a promise I make to my daughters when I tuck them in at night and a promise that you make to yours, a promise that has led immigrants to cross oceans and pioneers to travel west, a promise that led workers to picket lines and women to reach for the ballot.

Four years ago, I stood before you and told you my story, of the brief union between **a young man from Kenya and a young woman from Kansas** who weren't well-off or well-known, but shared a belief that in America their **son** could achieve whatever he put his mind to. It is that promise that's always set this country apart, that through hard work and sacrifice each of us can pursue our **individual dreams**, but still come together as **one American family,** to ensure that the next generation can pursue their dreams, as well. That's why I stand here tonight. Because for 232 years, at each moment when that promise was in jeopardy, ordinary men and women -- students and soldiers, farmers and teachers, nurses and janitors -- found the courage to keep it alive. We meet at one of those defining moments, a moment when our nation is at **war**, our **economy** is in turmoil, and the American promise has been threatened once more. Tonight, more Americans are **out of work** and more are **working harder for less**. More of you have **lost your homes** and even more are watching your **home values plummet**. More of you have cars you can't afford to drive, credit cards, **bills you can't afford to pay**, and tuition that's beyond your reach. These **challenges** are not all of government's making. But the **failure** to respond is a direct result of a broken politics in Washington and the failed policies of **George W. Bush.**

What is that **American promise**? It's a promise that says each of us has the **freedom** to make of our own lives what we will, but that we also have obligations to treat each other with dignity and respect. It's a promise that says the market should reward drive and innovation and generate growth, but that businesses should live up to their responsibilities to create American jobs, to look out for American workers, and play by the rules of the road. Ours is a promise that says government cannot solve all our problems, but what it should do is that which we cannot do for ourselves: **protect us from harm and provide every child a decent education; keep our water clean and our toys safe; invest in new schools, and new roads, and science, and technology.** Our government should work for us, not against us. It should help us, not hurt us. It should ensure opportunity not just for those with the most money and influence, but for every American who's willing to work. That's the promise of America, the idea that we are responsible for ourselves, but that we also rise or fall as one nation, the fundamental belief that I am my brother's keeper, I am my sister's keeper. That's the promise we need to keep. That's the **change** we need right now.

Fig. 2b

1 AFFIRMATIVE LAUGHTER

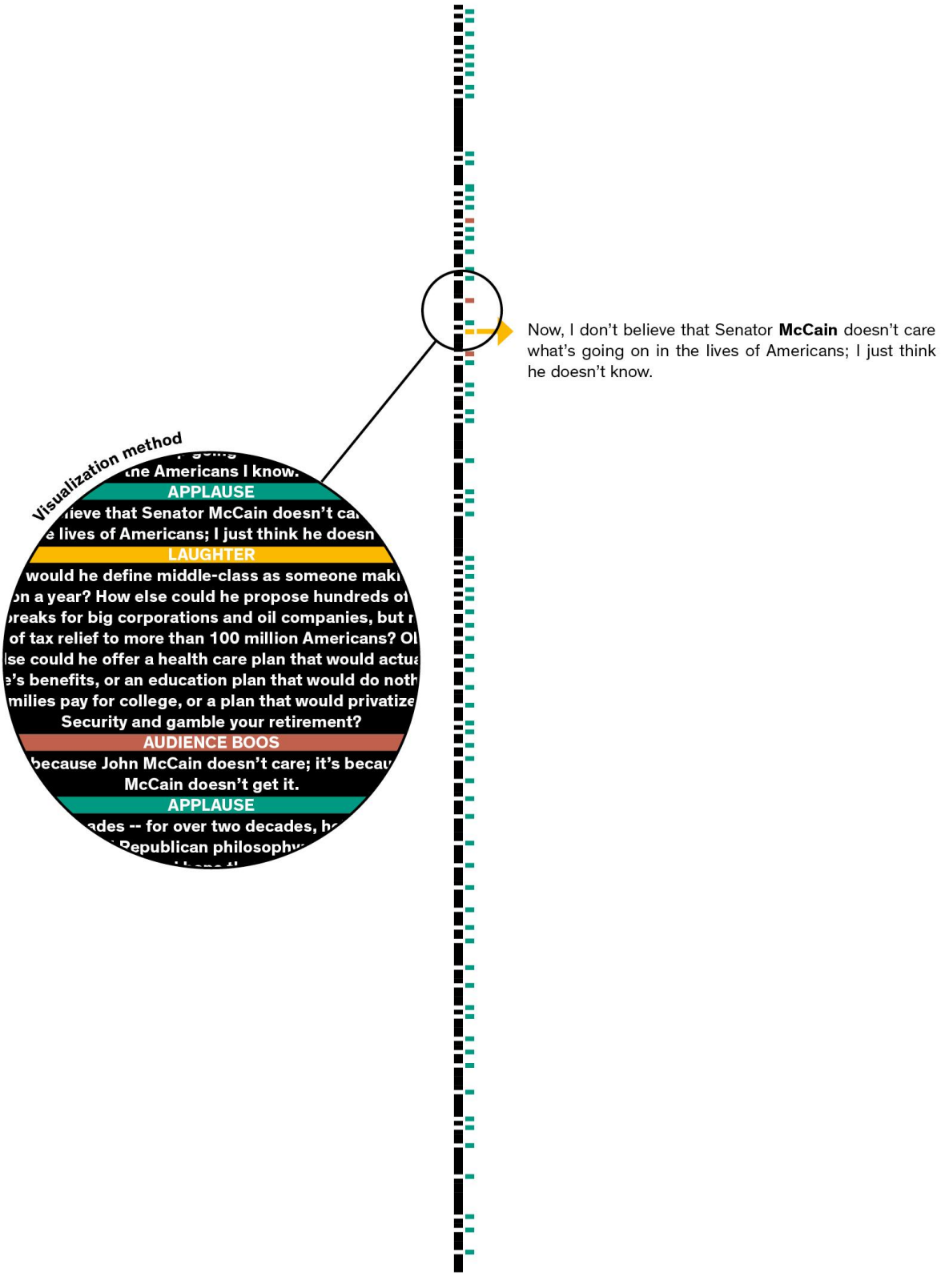
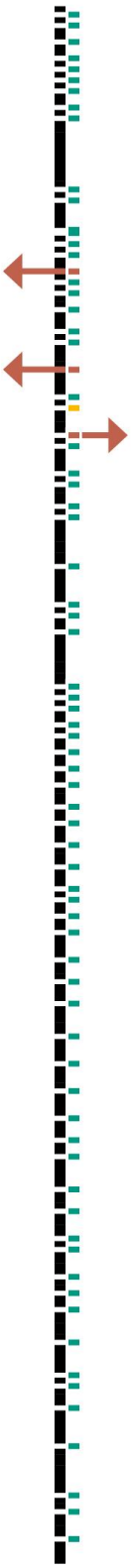


Fig. 2c

3 AFFIRMATIVE BOOS

The truth is, on issue after issue that would make a difference in your lives -- on health care, and education, and the economy -- **Senator McCain** has been anything but independent. He said that our economy has made great progress under this president. **He said** that the fundamentals of the economy are strong. And when one of his chief advisers, the man who wrote his economic plan, was talking about the anxieties that Americans are feeling, **he said** that we were just suffering from a mental recession and that we've become, and I quote, «a nation of whiners.»

This moment, this moment, this election is our chance to keep, in the 21st century, the American promise alive. Because next week, in Minnesota, the same party that brought you two terms of **George Bush** and **Dick Cheney** will ask this country for a third.



Why else would **he** define middle-class as someone making under $5 million a year? How else could **he** propose hundreds of billions in tax breaks for big corporations and oil companies, but not one penny of tax relief to more than 100 million Americans? OBAMA: How else could **he** offer a health care plan that would actually tax people's benefits, or an education plan that would do nothing to help families pay for college, or a plan that would privatize Social Security and gamble your retirement?

Fig. 3a

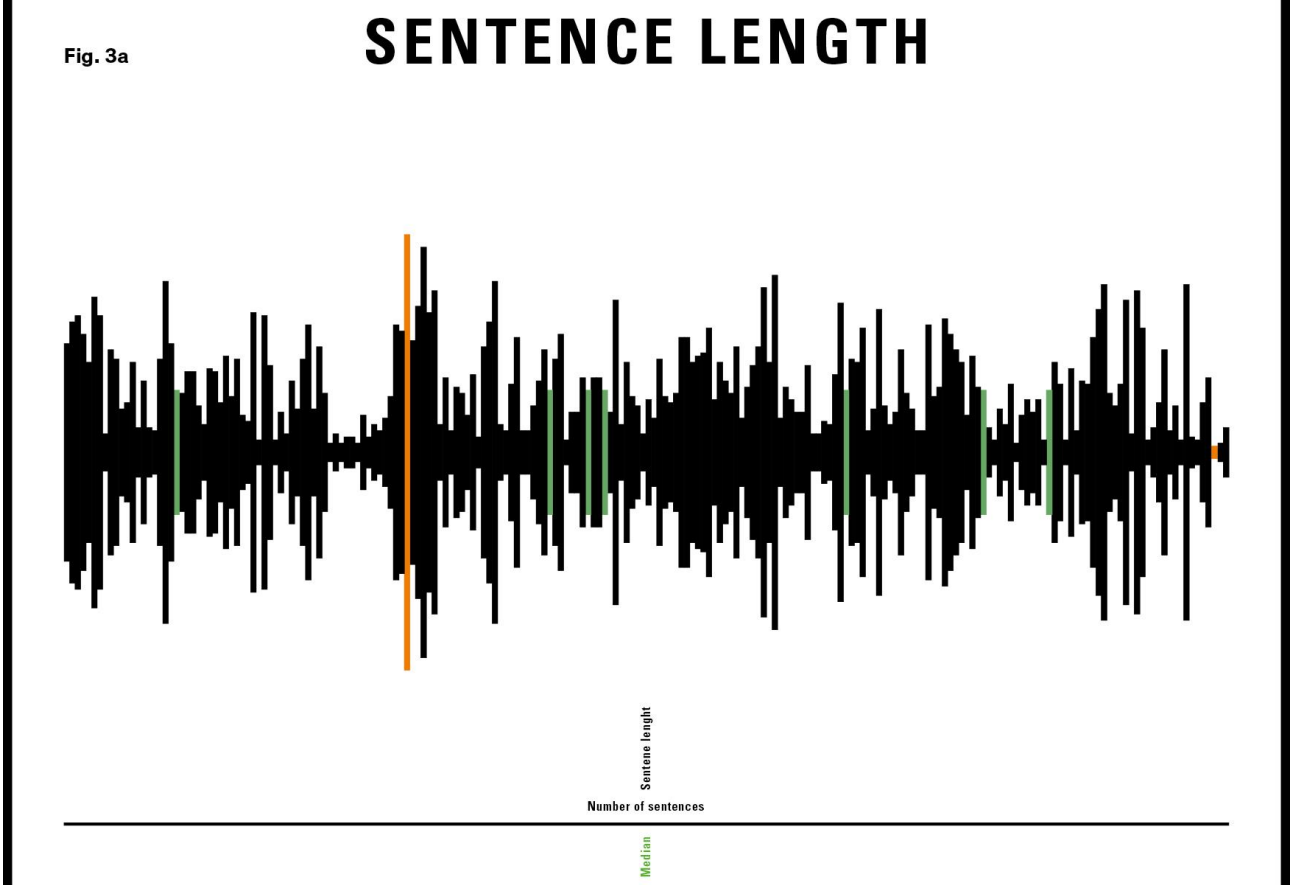

SENTENCE LENGTH
Sentene lenght
Number of sentences
Median

Fig. 3b

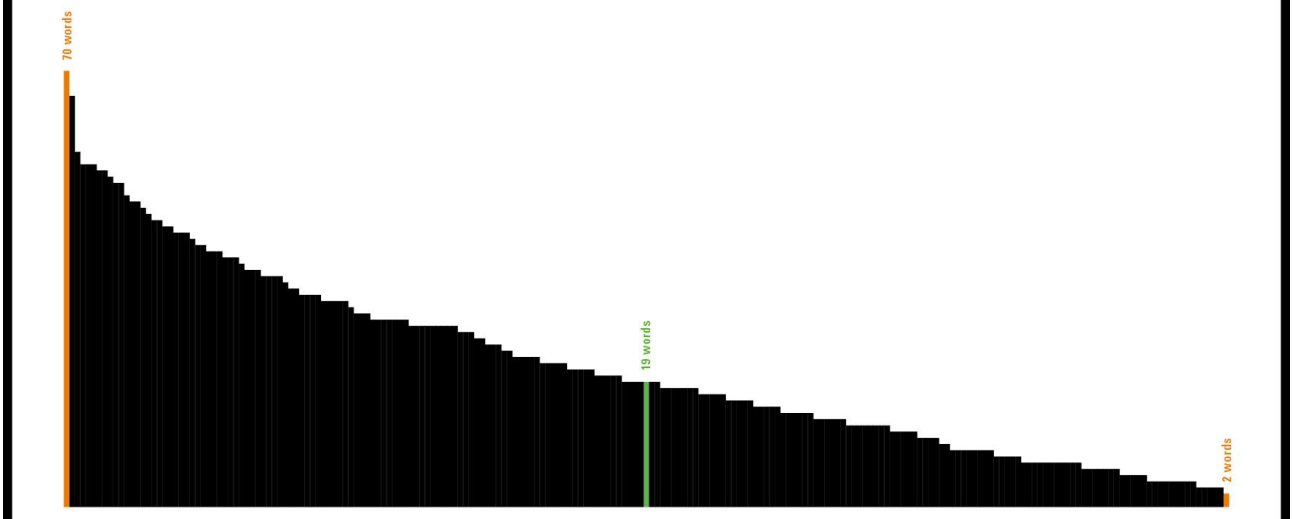

70 words
19 words
2 words

Fig. 4a

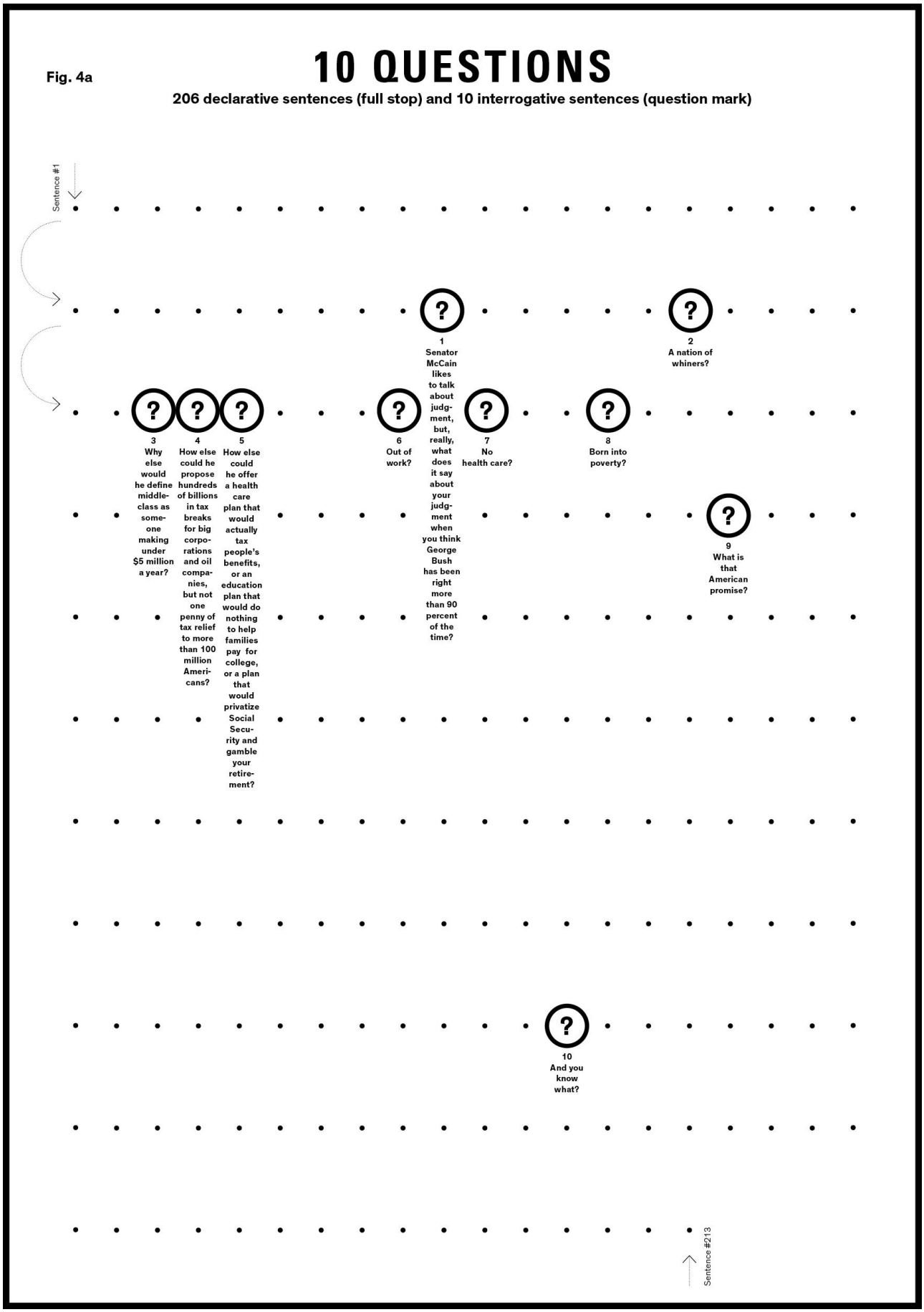

10 QUESTIONS
206 declarative sentences (full stop) and 10 interrogative sentences (question mark)
Sentence #1
1 Senator McCain likes to talk about judg-ment, but, really, what does it say about your judg-ment when you think George Bush has been right more than 90 percent of the time?
2 A nation of whiners?
3 Why else would he define middle-class as some-one making under $5 million a year?
4 How else could he propose hundreds of billions in tax breaks for big corpo-rations and oil compa-nies, but not one penny of tax relief to more than 100 million Ameri-cans?
5 How else could he offer a health care plan that would actually tax people's benefits, or an education plan that would do nothing to help families pay for college, or a plan that would privatize Social Secu-rity and gamble your retire-ment?
6 Out of work?
7 No health care?
8 Born into poverty?
9 What is that American promise?
10 And you know what?
Sentence #213

Fig. 4b

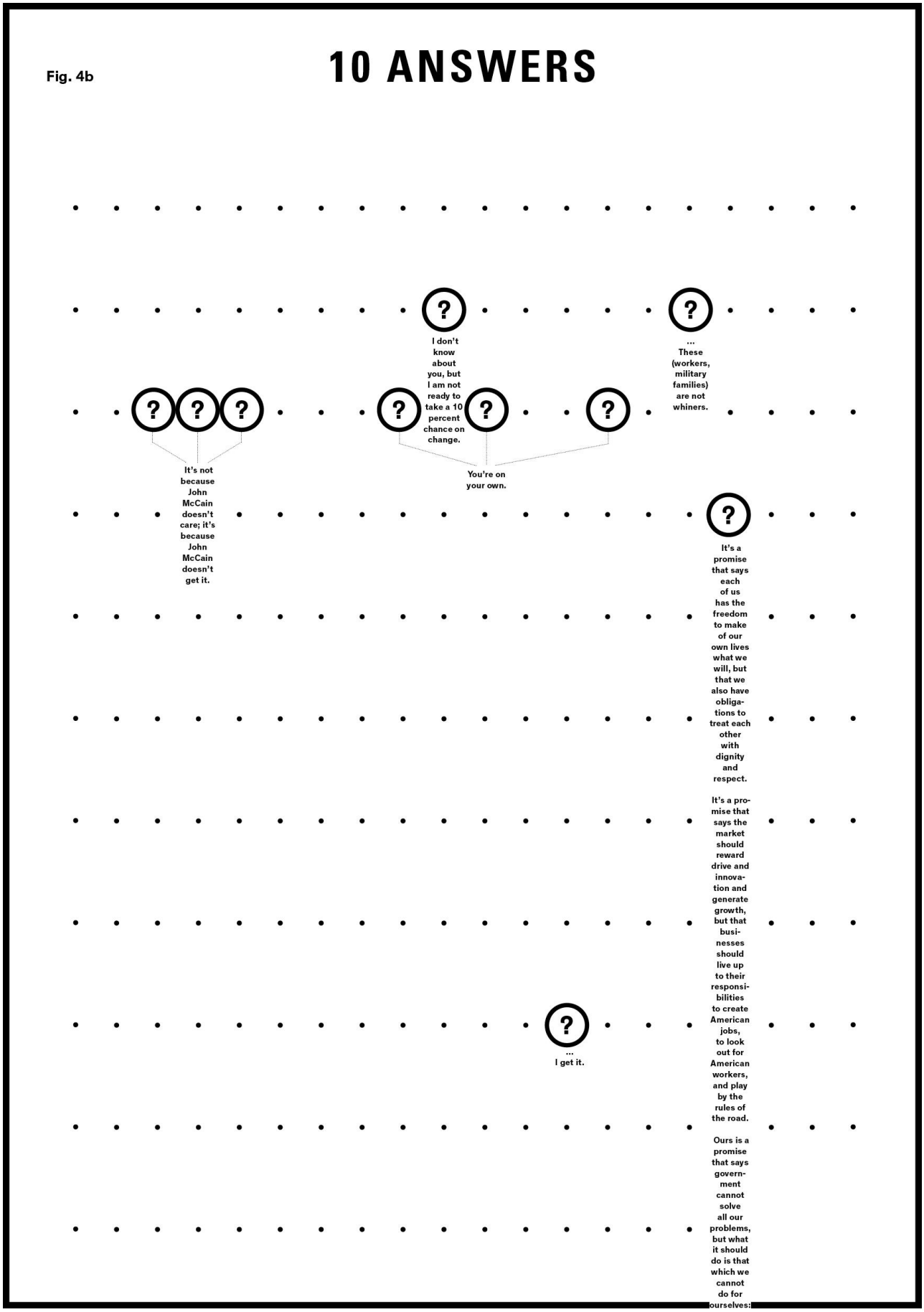

10 ANSWERS
?
It's not because John McCain doesn't care; it's because John McCain doesn't get it.
?
I don't know about you, but I am not ready to take a 10 percent chance on change.
?
You're on your own.
?
... These (workers, military families) are not whiners.
?
... I get it.
?
It's a promise that says each of us has the freedom to make of our own lives what we will, but that we also have obliga- tions to treat each other with dignity and respect.
It's a pro- mise that says the market should reward drive and innova- tion and generate growth, but that busi- nesses should live up to their responsi- bilities to create American jobs, to look out for American workers, and play by the rules of the road.
Ours is a promise that says govern- ment cannot solve all our problems, but what it should do is that which we cannot do for ourselves;

Fig. 5

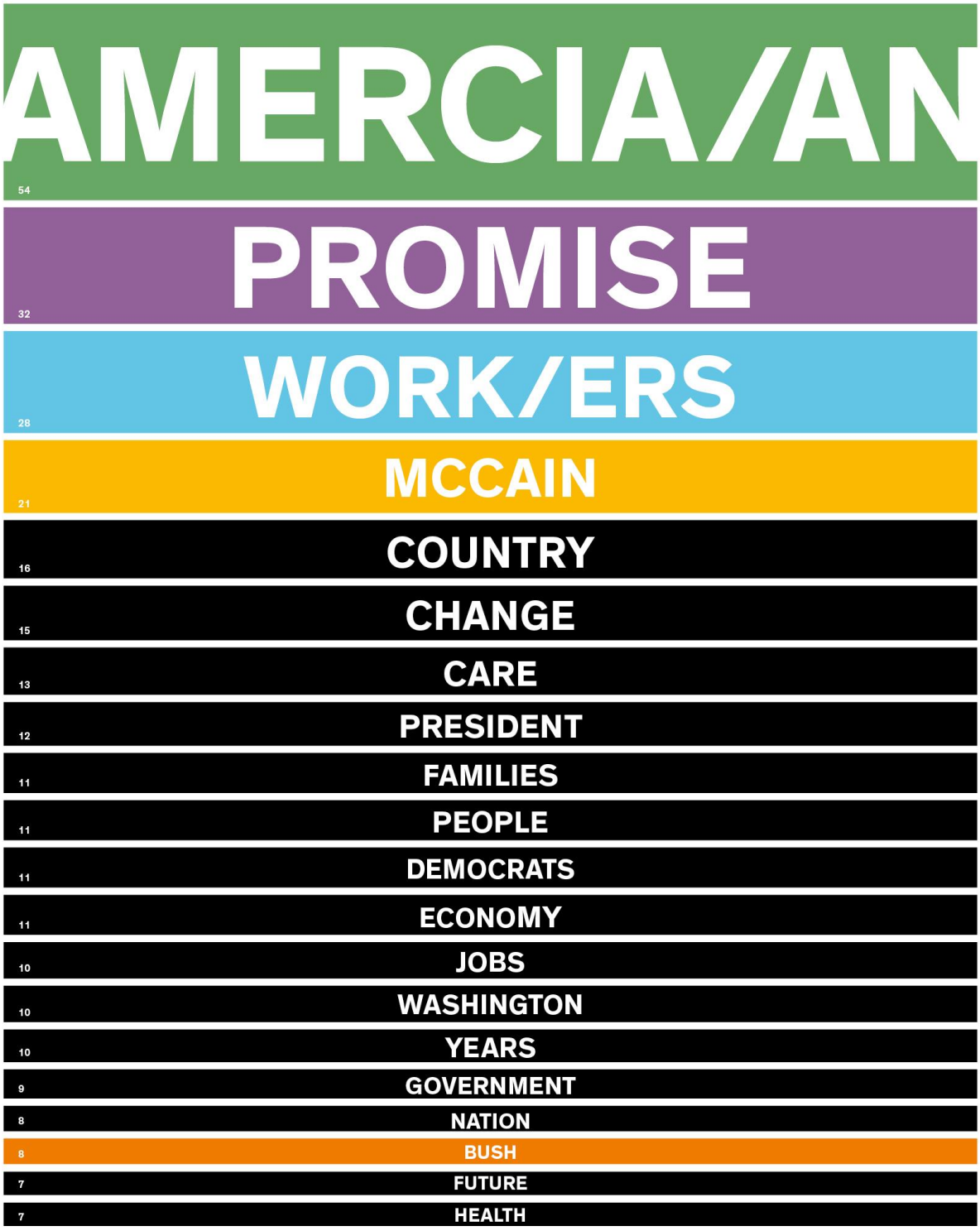

KEYWORDS
20 Most used substantives
AMERCIA/AN
54
PROMISE
32
WORK/ERS
28
MCCAIN
21
COUNTRY
16
CHANGE
15
CARE
13
PRESIDENT
12
FAMILIES
11
PEOPLE
11
DEMOCRATS
11
ECONOMY
11
JOBS
10
WASHINGTON
10
YEARS
10
GOVERNMENT
9
NATION
8
BUSH
8
FUTURE
7
HEALTH
7

Fig. 6a

TOPIC CLUSTERS

5 most used substantives

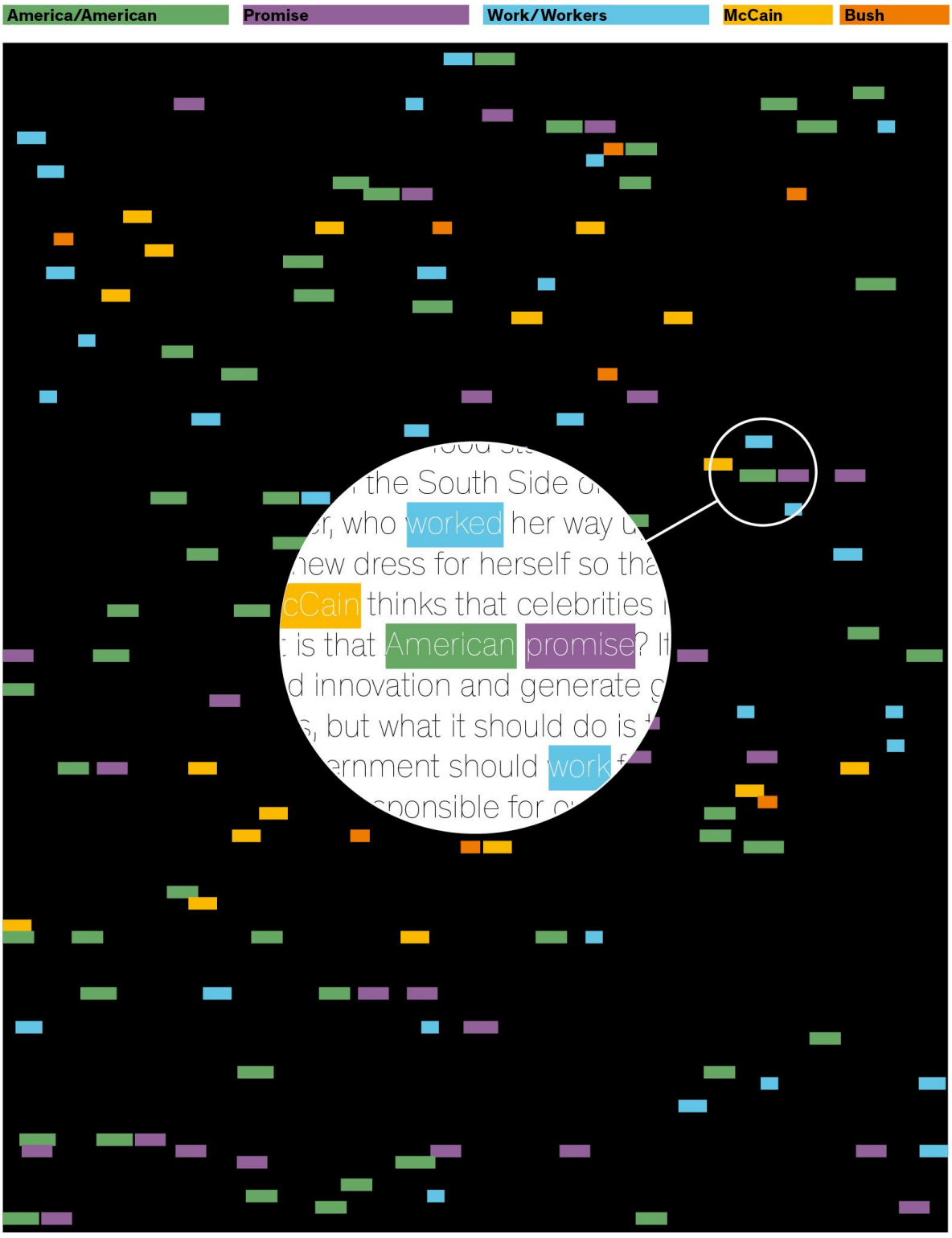


Fig. 6b

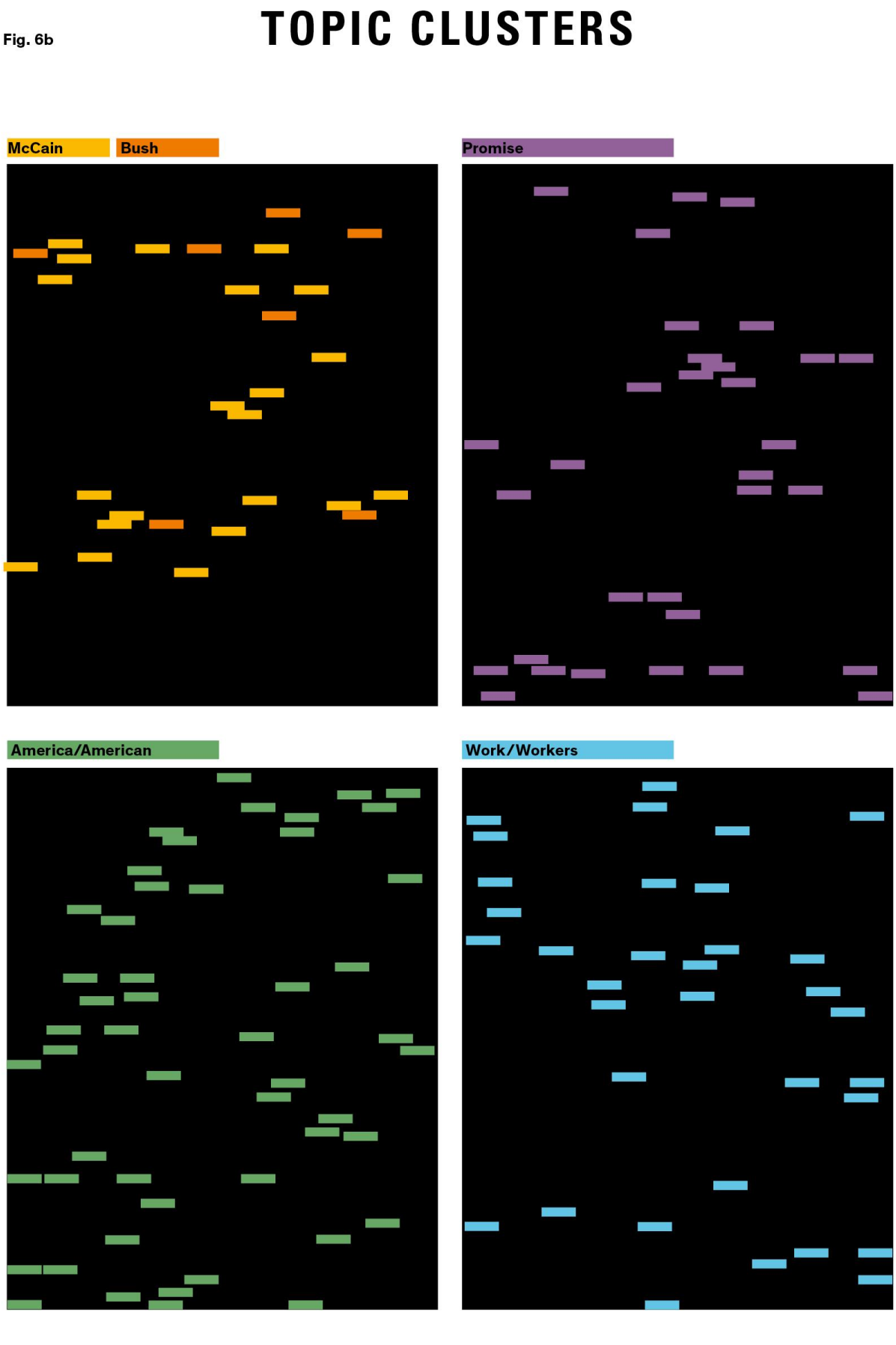
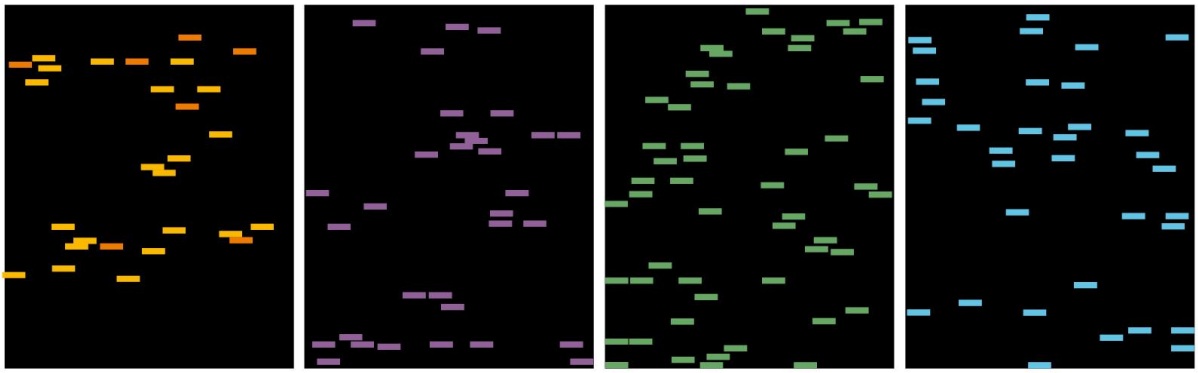

TOPIC CLUSTERS
McCain
Bush
Promise
America/American
Work/Workers

Fig. 6c

TOPIC CLUSTERS

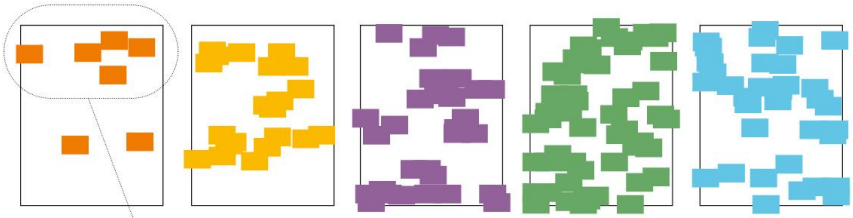
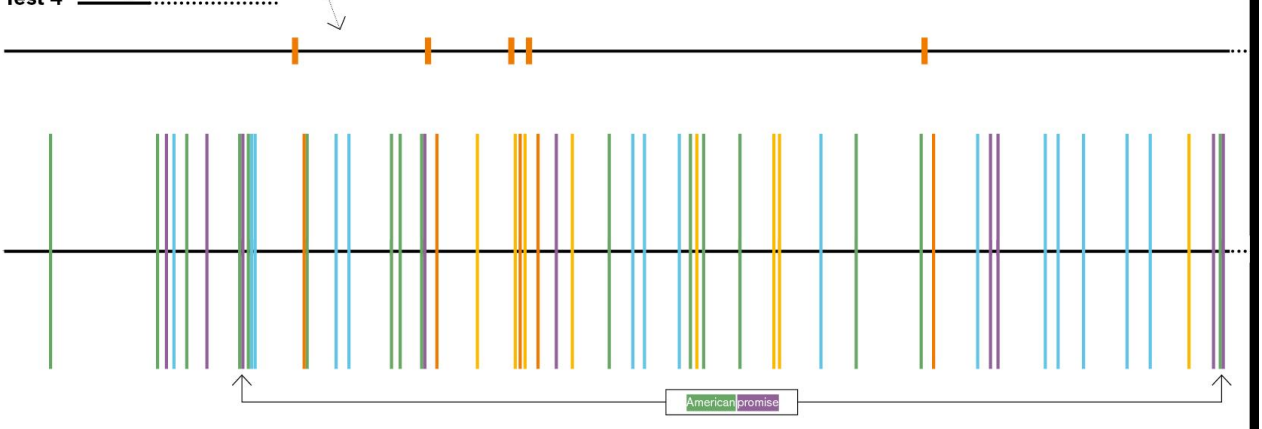
Data design: Parallel prototyping

Test 1



Test 2

Test 3



Test 4 Cutting