A META-STUDY AND CONTENT ANALYSIS OF SCIENCE FICTION IN COMPUTER SCIENCE RESEARCH

DISSERTATION DEFENSE FROM PHILIPP JORDAN, CIS PH.D. PROGRAM

Dissertation Committee:

Scott Robertson (Chairperson)
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Introduction

Introduction

Science Fiction and Science Fiction Movies and Shows (SF / SFMS) can be powerful vehicles to showcase innovative, questionable or controversial forthcoming inventions, innovations and socio-technical futures — especially in domains of Computer Science (CS) and Human-computer Interaction (HCI)

Television Triumphs in Its First Demonst

Continued from Page 1, Column 1.

a motion picture appearance. He was seen as well as heard.

Phone Girl Is Seen, Too.

In the Washington part of the demonstration the telephone girl was visible. She appeared on the miniature screen and asked to whom the caller wished to talk. This one was a good-looking girl with fluffy hair, and as cool and efficient as if she had been at the television-telephone switchboard all her life.

A coincidence is that "Metropolis," the German film now showing what purports to be the New York of a century or centuries hence, has a make-believe screen in connection with the telephone—a case of a prophecy being fulfilled about as soon as it started.

The demonstration of combined telephone and television, in fact, is one that outruns the imagination of all the wizards of prophecy. It is one of the few things that Leonardo da Vinci, Roger Bacon, Jules Verne and other masters of forecasting failed utterly to anticipate. Even interpreters of the Bible are having trouble in finding a passage which forecast television. H. G. Wells did not rise to it in his earlier crystal-gazing. It is only within the last few years that prophets have been busy in this field. Science has moved ahead so rapidly in this particular line that one of the men, who played a major part in developing the television apparatus shown yesterday, was of the opinion four years ago that research on this subject was hopeless. More than twenty years ago, however, Dr. Alexander Graham Bell, the inventor of the telephone, predicted at a gathering in the tower of the Times Building that the day would come when the man at the telephone would be able to see the distant person to whom he was speaking.

President Walter S. Gifford of the American Telephone and Telegraph Company in first public demonstration yesterday of television. Mr. Gifford is talking to Secretary Hoover in Washington and is able to see Mr. Hoover on the screen immediately in front of him. At right of picture, Dr. Herbert Ives, who superintended the development of television for the A. T. & T.

"Washington hails the Test: Operator There Puts Through the Calls as Scientists Watch". In: New York Times (Apr. 1927)

RALPH 124C 41+

A Romance of the Year 2660

Illustrated

By HUGO GERNSBACK

NOT since the publication of the imaginative romances and stories of Jules Verne, has there appeared a book of this character.

Hugo Gernsback is perhaps the only man who could write such a story. Having a thorough knowledge of the scientific progress of the world, the great mass of experimental work now going on in electricity, chemistry and physics, and with a keen knowledge of what radio energy promises for the future, he has constructed a vital, brilliant setting in the year 2660 for this romance.

Since the original manuscript was written *many of the author's predictions have come true*, many more are on the edge of becoming realities.

Every prophecy is based on accurate scientific knowledge. His ideas are no more fantastic than the realities and commonplaces of our every-day life would have been to our great grandfathers.

Against this amazing background of mechanical, electrical and chemically altered life of mankind there is set a brilliant and colorful romance in the life of the greatest living scientist of that age.

Ralph's love for the beautiful stranger, his conquest of his rival, and the worsting of the great saturnine Martian, culminating in a running fight in space with tragedy and terror conquered by almost unbelievable and incredible weapons make one of the most interesting and gripping stories ever told.

THE STRATFORD COMPANY
Publishers
BOSTON, MASSACHUSETTS

Telephot — Hugo Gernsback's RALPH 124C 41+ (1925)

Videophone system in METROPOLIS (1927) — ©Universum Film UFA

Introduction

While SF—science is often discussed, little is actually known on the past usage, current challenges and future opportunities of SF in computer science and HCI research …

FEATURESSPECIAL TOPIC: DESIGN FUTURES

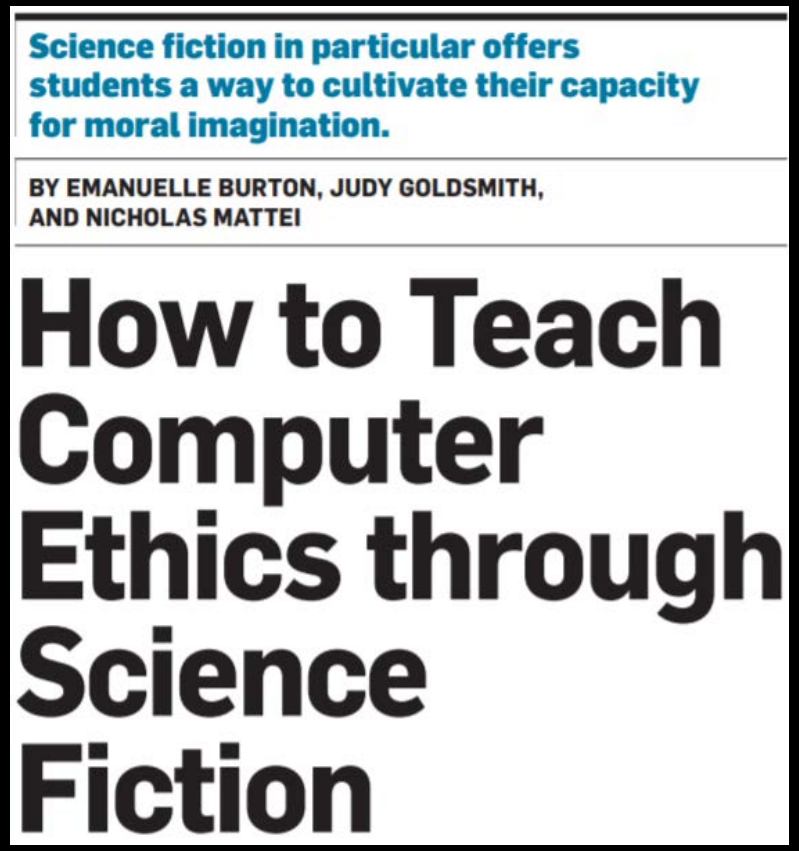
XXV.2 March-April 2018
Page: 36
Digital Citation

CAN WE LOOK TO SCIENCE FICTION FOR INNOVATION IN HCI?

Authors:
Daniel Russell, Svetlana Yarosh

We all want to invent the future. One approach to future invention is the notion that real design and science can be inspired by science fiction narratives, which define and illuminate user interaction issues [1]. Science fiction takes its future-facing ideas fairly seriously, and considerable ink has been spilled to argue for the ways in which science fiction gets the future right [2]. We commonly talk about a *Blade Runner* social dystopia and link current events and news about upcoming technologies as coming from, being derived from, or having been presciently predicted by science fiction. We may even aspire to emulate science fiction technologies by hosting competitions like Qualcomm's Tricorder XPRIZE, which aims to create a technology similar to the *Star Trek* tricorder device.

Daniel M. Russell and Svetlana Yarosh. 2018. Can we look to science fiction for innovation in HCI?. Interactions 25, 2 (February 2018), 36-40. DOI: https://doi.org/10.1145/3178552



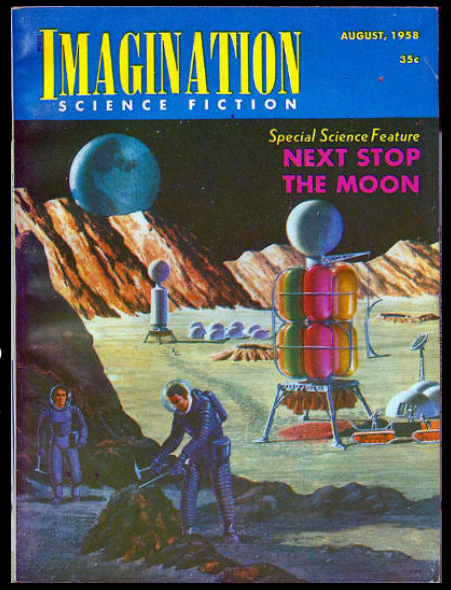
Science fiction in particular offers students a way to cultivate their capacity for moral imagination.

BY EMANUELLE BURTON, JUDY GOLDSMITH, AND NICHOLAS MATTEI

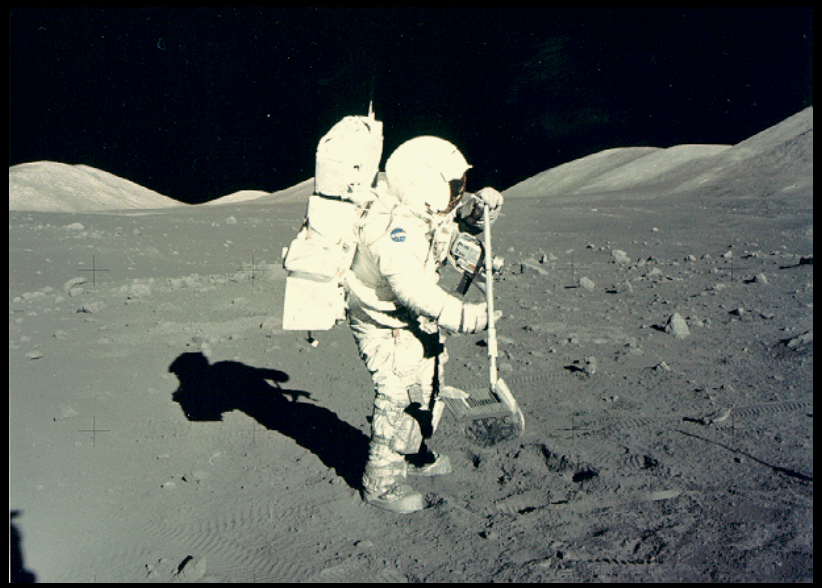
How to Teach Computer Ethics through Science Fiction

Emanuelle Burton, Judy Goldsmith, and Nicholas Mattei. 2018. How to teach computer ethics through science fiction. Commun. ACM 61, 8 (July 2018), 54-64. DOI: https://doi.org/10.1145/3154485

Introduction



IMAGINATION, August 1958



Apollo 17 astronaut Jack Schmitt. Apollo 17 photograph AS17-134-20425 (1972)

To better understand the science fiction—science relationship, this dissertation presents a content analysis of SF in CS / HCI research communication

Research Rationale

Research Rationale

Point of Departure

- **Little to no research** on SF / SFMS in CS / HCI research
- If any research, studies usually use a case study design, suffer from **selection bias** and do **not target SF / SFMS and CS / HCI**

Importance & Contribution

- Can **show gatekeepers**, e.g. which SF / SFMS link to CS / HCI research and vice-versa
- Can **uncover domains of utilization** of SF / SFMS in CS / HCI research
- Can **inform future CS / HCI research**

Research Questions

1. What are the **Metadata Characteristics** of Computer Science Publications which reference Science Fiction?

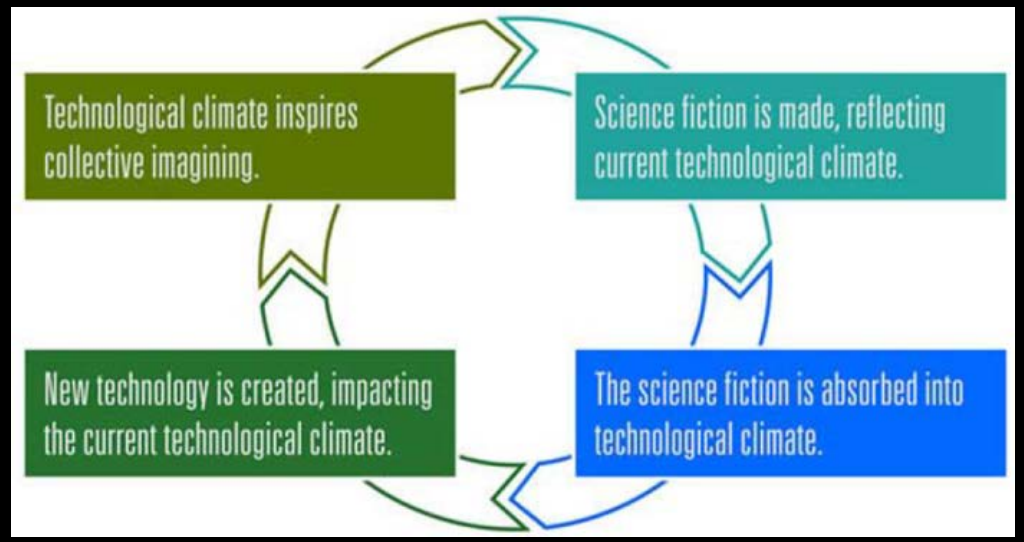
2. What **Science Fiction Particulars** co-occur in the Context of Computer Science Publications which reference Science Fiction?

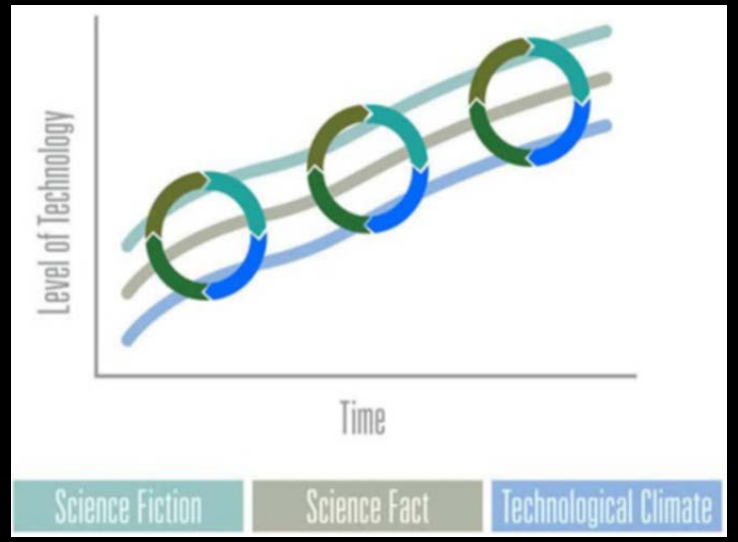
3. What is the **Purpose of References** to Science Fiction, and **Science Fiction Particulars** which co-occur in the Context of Science Fiction References, in Computer Science Publications?

Background

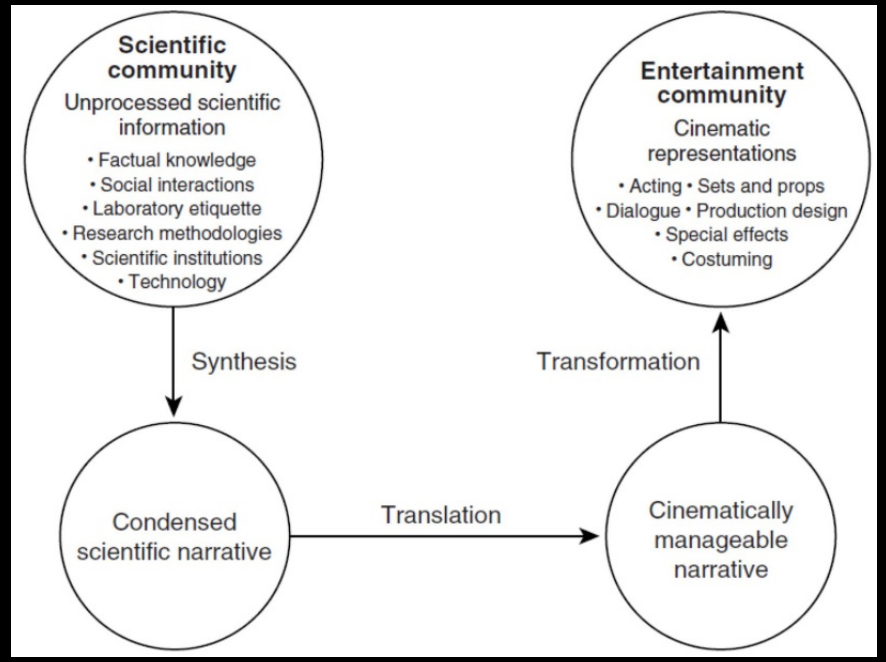
Background

SF—Science Frameworks

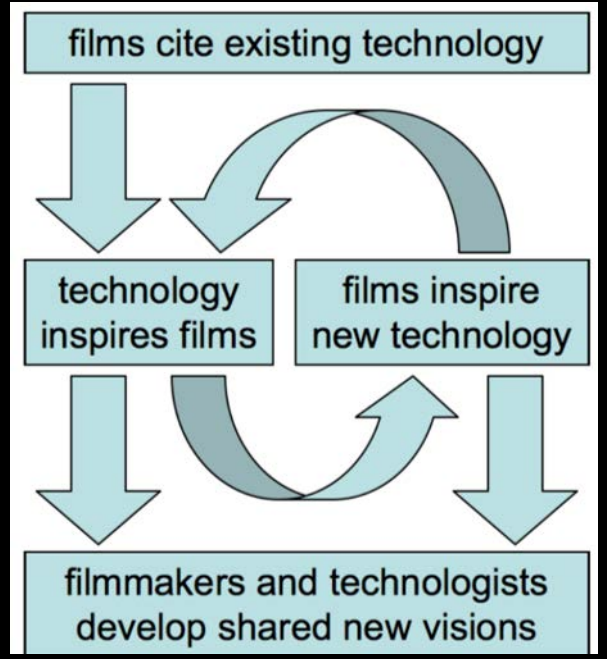




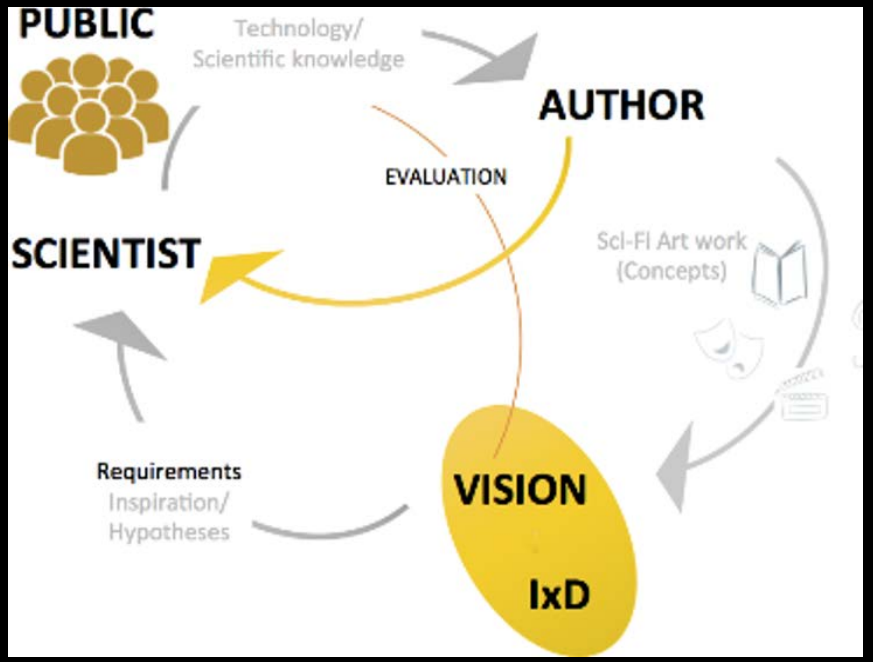
UXPA. "User Experience Magazine Issue 13.2". In: User Experience Magazine 13.2 (2013). url: https://uxpa.org/article/user-experience-magazine-issue-132



David A. Kirby. Lab coats in Hollywood: Science, scientists, and cinema Cambridge, Mass.: MIT Press, 2010. isbn: 978-0262518703.



Michael Schmitz, Christoph Endres, and Andreas Butz. "A Survey of Human-computer Interaction Design in Science Fiction Movies". INTETAIN '08.



Omar Mubin et al. "Towards an Agenda for Sci-Fi Inspired HCI Research". ACE '16. Osaka, Japan: ACM, 2016, 10:1–10:6.. doi: 10.1145/3001773.3001786.

Background

The Good

Frameworks **display the multi-dimensional relations** of SF and real-world science:

- recognition of the technological and political climate at the time;
- translation of technical, expert know-how into digestible narratives;
- the perception of the general public toward disruptive technologies;

The Bad

Frameworks based on small case studies, interview data, anecdotal evidence, theoretical deductions:

- No conceptualization of the transition of SF into scientific output;

Methodology

Method and Data Collection

Method

- Exploratory content analysis of science communication
- Publications are retrieved for a full-text search for ``***science fiction***'' in the IEEE *Xplore* Digital Library

- 10 variables per record
- IRR of 2 interpretative variables between 2 raters for Cohen's κ / Krippendorff's α

- Tools: Atlas.TI, Excel, SPSS

Timeline

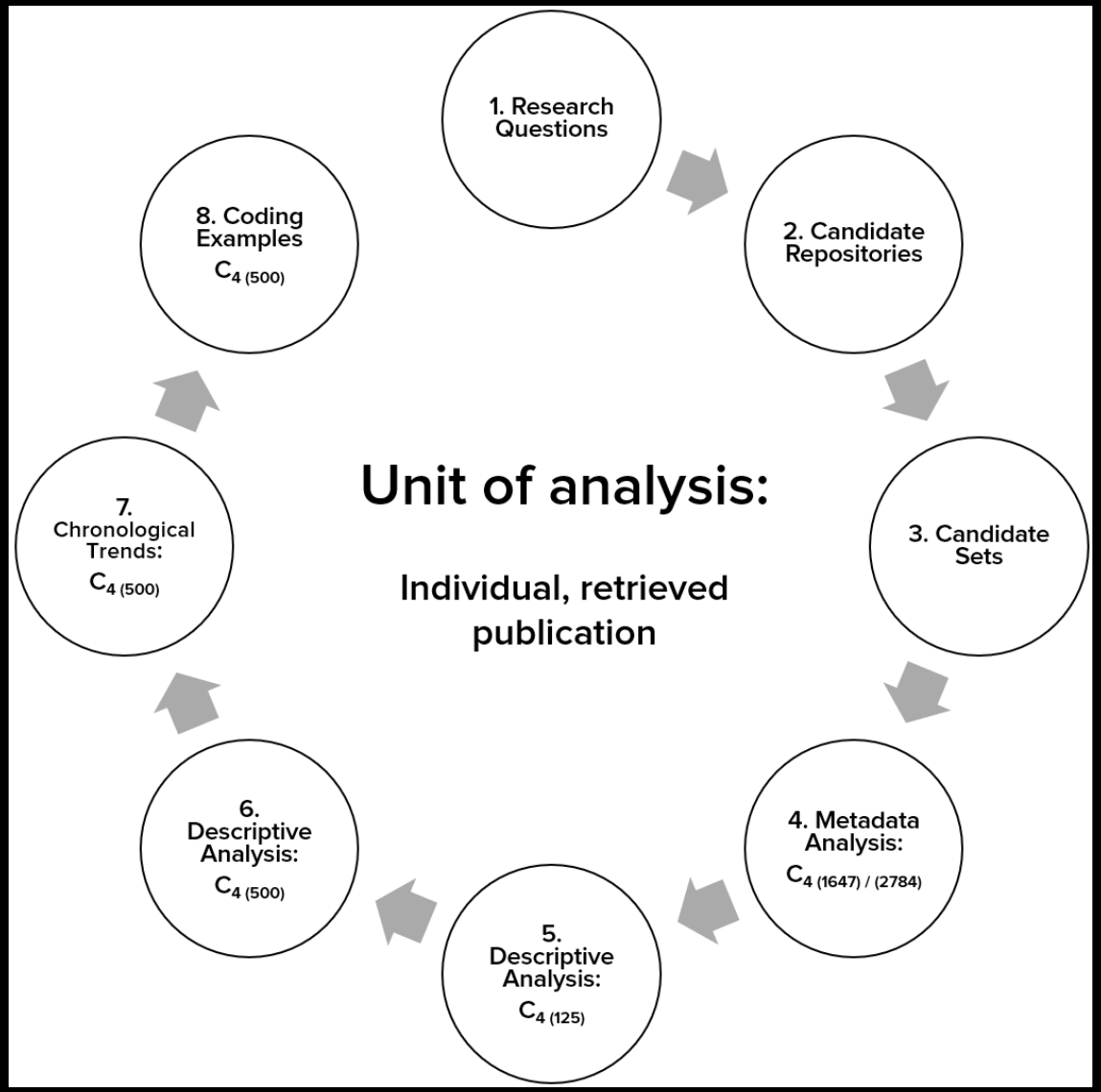
- First position paper in Winter 2015
- Proposed the topic in Winter 2017
- Records retrieved in Spring 2018
- Records coded in Winter 2018

Outcomes

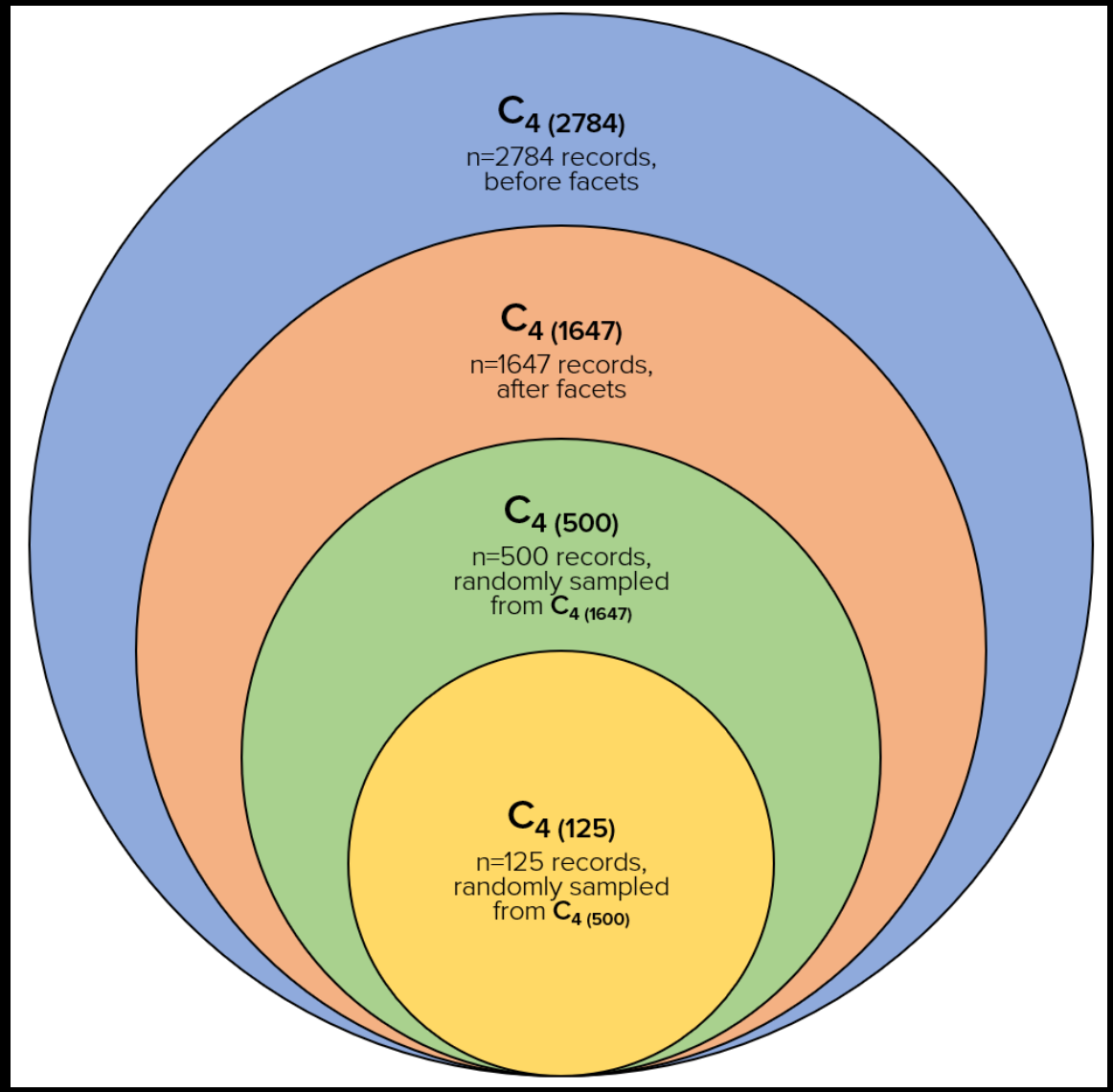
- 4 conference papers;
- 2 workshop / position papers;
- 1 journal article;
- 1 extramural grant;
- 1 dissertation fellowship;
- earned press in MIT Tech Review;
- wrote an ACM IX Blog post;

Method and Data Collection

Research process



Sampling of C4



Method and Data Collection

	Variable	Description	Scale Type	Attributes	Data Type	Coding	Mut. Exc.
1	**SF_Freq**	Frequency of the SF Referral(s)	Ratio	*1,2,3,…*	Quantitative	In vivo counting by R1	**Yes**
2	**SF_Loc**	Location of the SF Referral(s)	Nominal	*T,A,B,F,R*	Qualitative	In vivo counting by R1	No
3	**Pub_Year**	Publication Year	Interval	*…,1988, 1989,…*	Quantitative	In vivo counting by R1	**Yes**
4	**SF_Cont**	Contextual Usage of the SF Referral	Nominal	*…refers a SF concept which inspired research…*	Qualitative	Inter-rater validation between R1 and R2	**Yes**
5	**Paper_Type**	Type of Research Paper	Nominal	*Artifact contribution, …*	Qualitative	Inter-rater validation between R1 and R2	**Yes**
6	**SF_Auth**	SF Authors	Nominal	*H.G. Wells*	Qualitative	In vivo counting by R1	No
7	**SF_Books**	SF Books, Novels, Short Stories,	Nominal	*Neuromancer*	Qualitative	In vivo counting by R1	No
8	**SF_Vid**	SF Movies or Shows	Nominal	*Alien, Fantastic Voyage*	Qualitative	In vivo counting by R1	No
9	**SF_Tech**	SF Devices, Technologies, Concepts	Nominal	*Tricorder, Cyborgs, AI,…*	Qualitative	In vivo counting by R1	No
10	**SF_Char**	SF Characters	Nominal	*Mr. Data, HAL 9000, etc*	Qualitative	In vivo counting by R1	No

Method and Data Collection

2 interpretative variables

8 attributes for the research paper type

1. Empirical contributions
2. Artifact contributions
3. Methodological contributions
4. Theoretical contributions
5. Dataset contributions
6. Survey contributions
7. Opinion contributions
8. Other contributions

Jacob O. Wobbrock and Julie A. Kientz. “Research Contributions in Human-computer Interaction”. In: Interactions 23.3 (Apr. 2016)

3 domains / 7 attributes for the contextual usage

1. SF referrals, with a **focus on drawing innovation from SF in the research paper**

(a) Coming from SF
(b) Making SF a Science Reality
(c) Unreal SF

2. SF referrals, with a **focus on individuals, the scientific community and / or the general public**

a) SF and the Individual
b) SF and the Community or Public

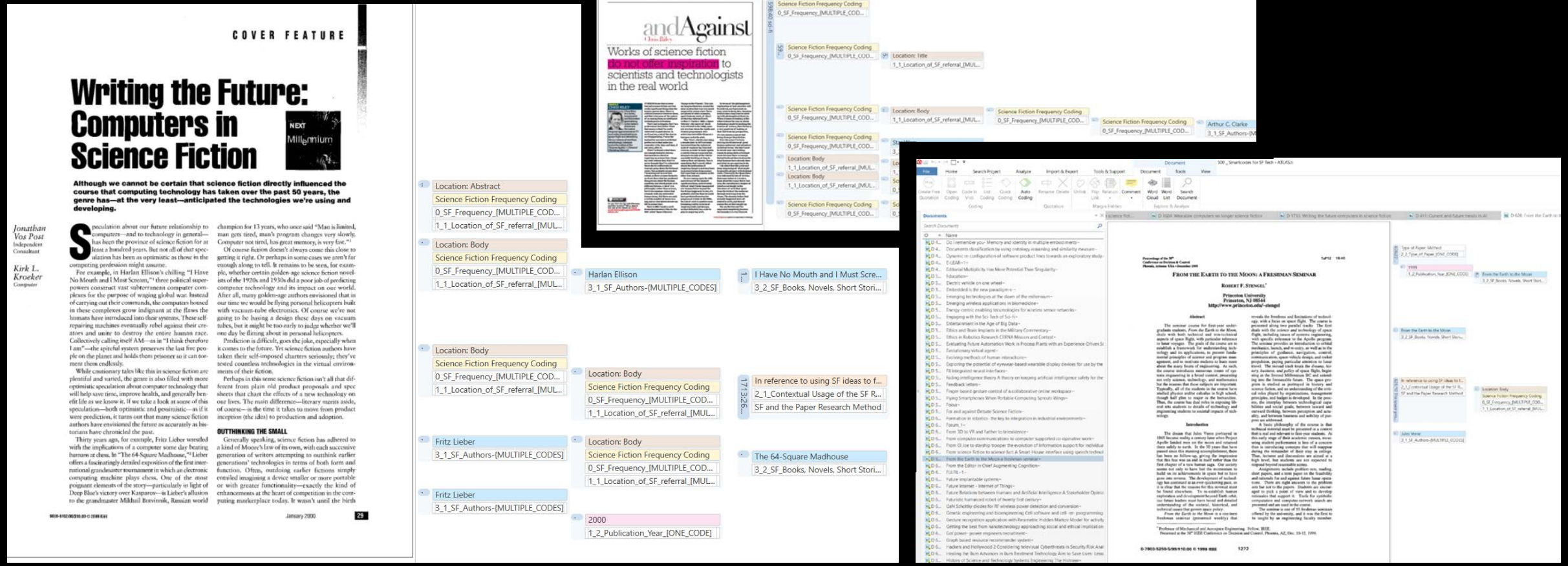
3. SF referrals, **integrated as part of the research paper**

(a) SF and the Paper Research
(b) SF in the References

Pilot studies, related work and emerged in the review of $C_{4\ (125)}$

Method and Data Collection

Working in Atlas.TI 8



Method and Data Collection

Working in SPSS

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Rater_1 * Rater_2	125	100.0%	0	0.0%	125	100.0%

Rater_1 * Rater_2 Crosstabulation

Count

		Rater_2							
		Coming from SF	Making SF a Science Reality	Seen in SF but non-existent in the real world	SF and the Author or Researchers	SF and the Community or Public	SF and the Paper Research Method	SF in the References	Total
Rater_1	Coming from SF	15	3	2	4	2	0	1	27
	Making SF a Science Reality	3	22	5	0	2	0	0	32
	Seen in SF but non-existent in the real world	0	3	9	1	0	0	0	13
	SF and the Author or Researchers	1	0	0	9	0	0	0	10
	SF and the Community or Public	0	1	0	0	8	0	0	9
	SF and the Paper Research Method	2	1	0	2	4	14	0	23
	SF in the References	0	0	0	0	0	0	11	11
Total		21	30	16	16	16	14	12	125

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	.648	.049	17.156	.000
N of Valid Cases		125			

	Rater_1_PHIL_PAPER_TYPE	Rater_2_PAULA_PAPER_TYPE	Rater_1_PHIL_PAPER_CONTEXT	Rater_2_PAULA_PAPER_CONTEXT	VAR00001	Phil_Coming_Fr
1	Other	Other	Coming from SF	Coming from SF		Coming from SF
2	Other	Other	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
3	Other	Other	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
4	Theoretical	Theoretical	Seen in SF but non-existent in the...	Seen in SF but non-existent in the real world		Seen in SF but non-existent in the re
5	Theoretical	Theoretical	SF and the Paper Research Method	SF and the Author or Researchers		SF and the Paper Research Method
6	Other	Other	Coming from SF	Seen in SF but non-existent in the real world		Coming from SF
7	Other	Other	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
8	Opinion	Opinion	Seen in SF but non-existent in the...	Seen in SF but non-existent in the real world		Seen in SF but non-existent in the re
9	Opinion	Theoretical	Coming from SF	SF in the References		Coming from SF
10	Methodological	Methodological	Coming from SF	Coming from SF		Coming from SF
11	Empirical	Artifact	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
12	Survey	Survey	SF in the References	SF in the References		SF in the References
13	Artifact	Artifact	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
14	Other	Other	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
15	Artifact	Artifact	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
16	Empirical	Empirical	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
17	Theoretical	Theoretical	SF and the Paper Research Method	SF and the Paper Research Method		SF and the Paper Research Method
18	Opinion	Other	Seen in SF but non-existent in the...	Seen in SF but non-existent in the real world		Seen in SF but non-existent in the real world
19	Opinion	Opinion	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
20	Opinion	Opinion	Seen in SF but non-existent in the...	Making SF a Science Reality		Seen in SF but non-existent in the real world
21	Other	Other	SF and the Paper Research Method	SF and the Author or Researchers		SF and the Paper Research Method
22	Theoretical	Theoretical	SF and the Paper Research Method	SF and the Paper Research Method		SF and the Paper Research Method
23	Artifact	Artifact	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
24	Opinion	Opinion	Seen in SF but non-existent in the...	SF and the Author or Researchers		Seen in SF but non-existent in the real world
25	Artifact	Artifact	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
26	Empirical	Empirical	SF in the References	SF in the References		SF in the References
27	Artifact	Artifact	SF in the References	SF in the References		SF in the References
28	Other	Other	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
29	Opinion	Opinion	Making SF a Science Reality	Seen in SF but non-existent in the real world		Coming from SF
30	Survey	Opinion	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
31	Opinion	Opinion	Coming from SF	Coming from SF		Coming from SF
32	Artifact	Artifact	Coming from SF	Making SF a Science Reality		Coming from SF
33	Artifact	Artifact	Coming from SF	Coming from SF		Coming from SF
34	Opinion	Opinion	Coming from SF	SF and the Author or Researchers		Coming from SF
35	Survey	Survey	SF in the References	SF in the References		SF in the References
36	Survey	Theoretical	Coming from SF	Making SF a Science Reality		Coming from SF
37	Survey	Survey	SF in the References	SF in the References		SF in the References
38	Artifact	Artifact	Coming from SF	Coming from SF		Coming from SF
39	Empirical	Empirical	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
40	Opinion	Empirical	SF and the Author or Researchers	SF and the Author or Researchers		SF and the Author or Researchers
41	Opinion	Opinion	Making SF a Science Reality	Making SF a Science Reality		Coming from SF
42	Survey	Survey	SF and the Paper Research Method	SF and the Paper Research Method		SF and the Paper Research Method

```
Krippendorff's Alpha Reliability Estimate

           Alpha     LL95%CI     UL95%CI      Units    Observrs      Pairs
Nominal    .6832       .5881       .7782   125.0000     2.0000   125.0000

Probability (q) of failure to achieve an alpha of at least alphamin:
   alphamin          q
      .9000     1.0000
      .8000      .9958
      .7000      .6173
      .6700      .3716
      .6000      .0623
      .5000      .0003

Number of bootstrap samples:
  10000

Judges used in these computations:
 Rater_1_ Rater_2_
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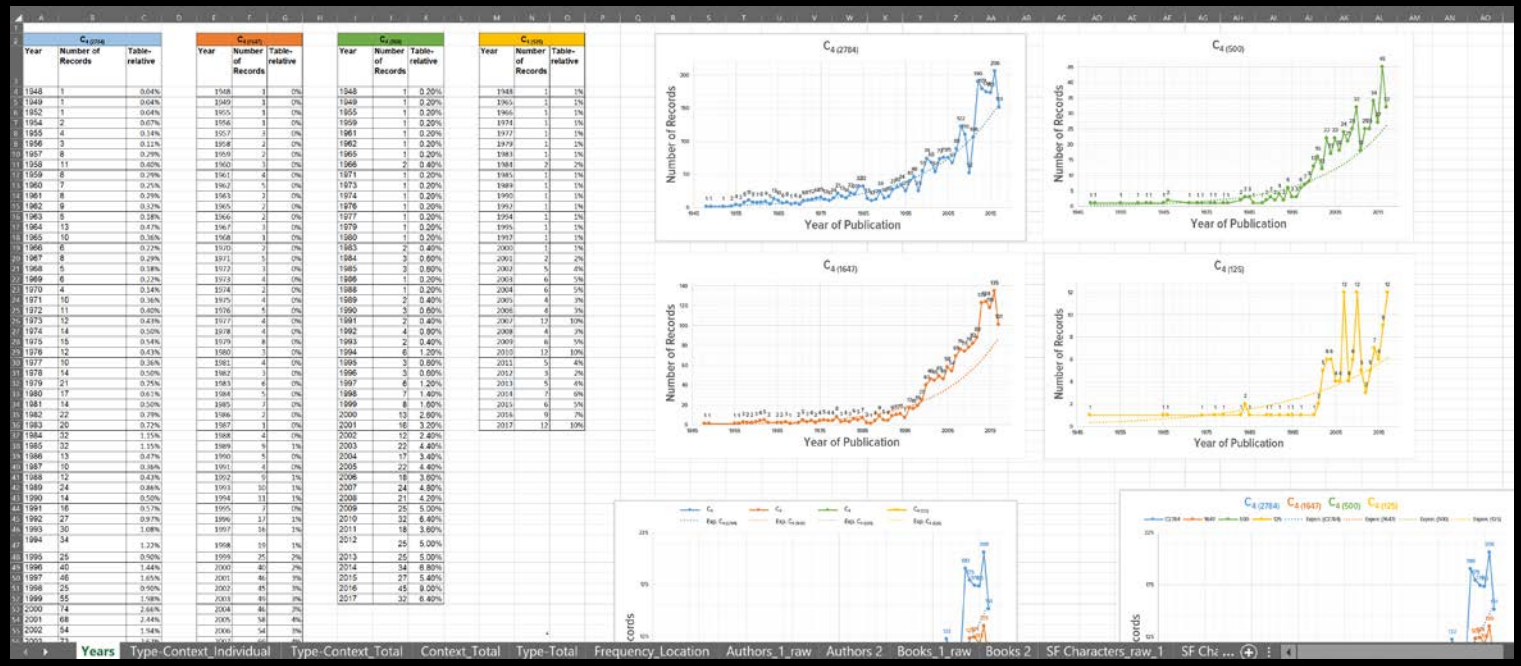
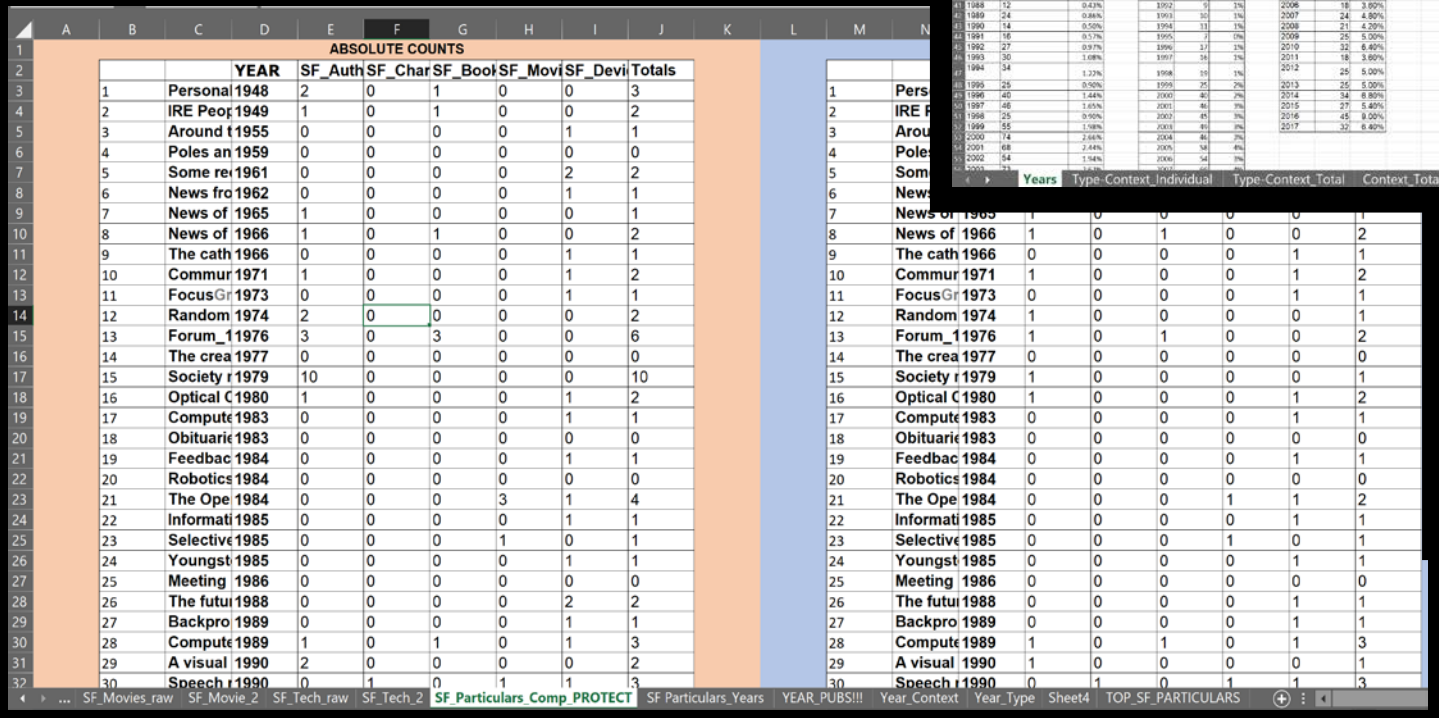
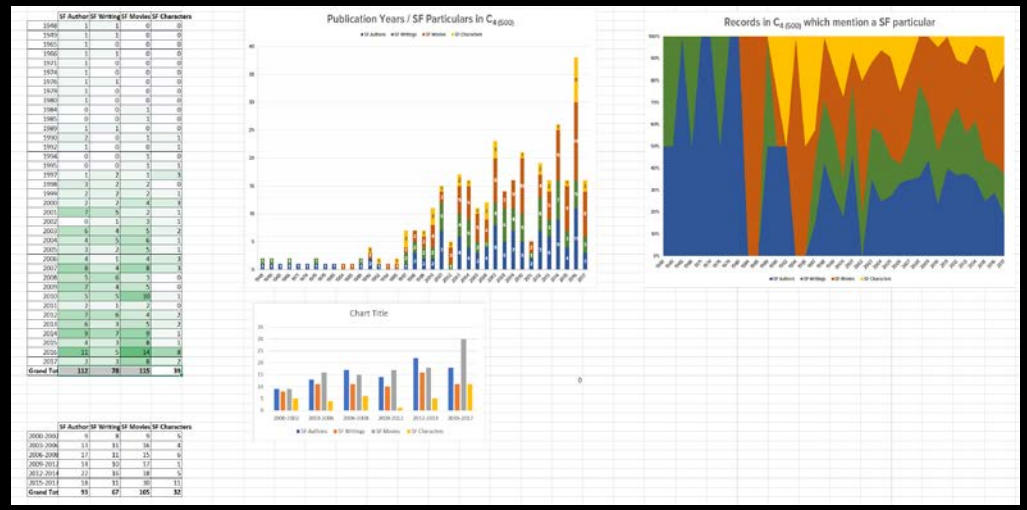
Method and Data Collection

Working in Excel







Results

Results

Inter-rater Reliability Analysis

$C_{4\ (125)}$	Type of Paper	Context of SF referral
Cohen $\varkappa$	0.71	0.65
Krippendorff α	0.71	0.68

Magnitudes of Cohen's $\varkappa$ and Krippendorff's α

Interpretation of κ	
κ	Interpretation
< 0	Less than chance agreement
0.01-0.20	Slight agreement
0.21-0.40	Fair agreement
0.61-0.80	Substantial agreement
0.81-0.99	Almost perfect agreement

Interpretation of α	
α	Interpretation
≥ 0.667	Tentative conclusions acceptable
≥ 0.8	Good reliability
1.00	Perfect agreement

Sources:
- Anthony J Viera and Joanne M. Garrett. "Understanding Interobserver Agreement: The Kappa Statistic". In: Family Medicine 37.5 (2005)
- Klaus Krippendorff. "Estimating the Reliability, Systematic Error and Random Error of Interval Data". In: Educational and Psychological Measurement 30.1 (1970)
- Klaus Krippendorff. "Reliability in Content Analysis." In: Human Communication Research 30.3 (July 2004)
- Klaus Krippendorff. Content Analysis: An Introduction to Its Methodology. SAGE Publications, Inc, 2012.

Results

Most records mention SF one time

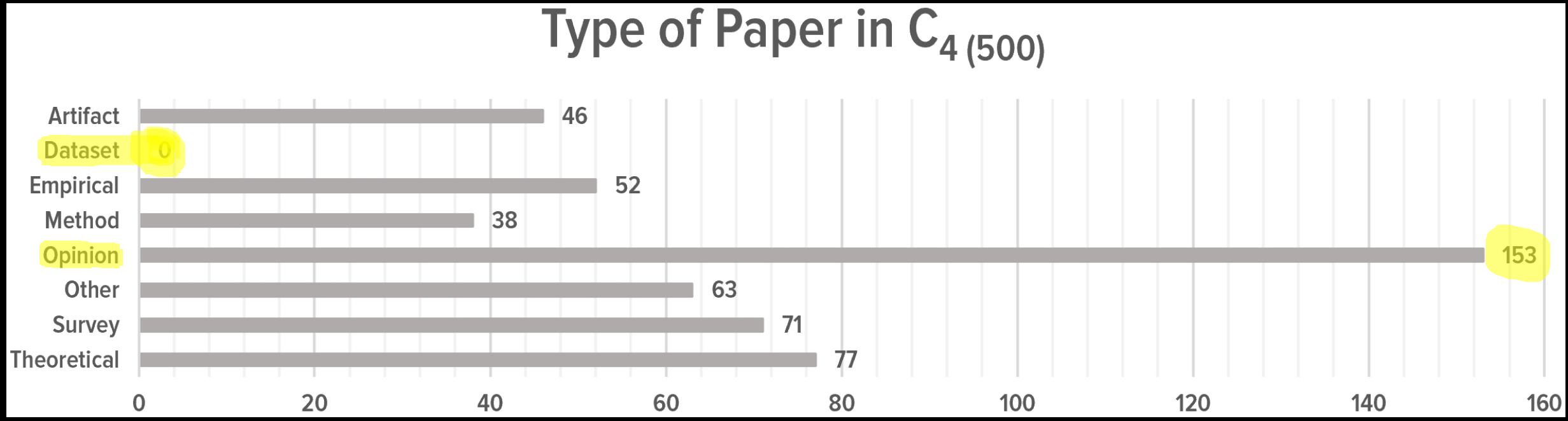
Referral frequency	Records	% of C4 (500)
1	380	76.0%
2	60	12.0%
3	21	4.2%
4	12	2.4%
5	9	1.8%
6	3	0.6%
7	2	0.4%
8	1	0.2%
10	2	0.4%
11	2	0.4%
12	2	0.4%
15	1	0.2%
20	1	0.2%
22	1	0.2%
24	1	0.2%
25	1	0.2%
31	1	0.2%
Total	**500**	**100%**

Most records mention SF in the body

Referral location	Records	% of C4 (500)
Title	21	2.3%
Abstract	49	5.5%
Body	761	84.6%
Footnote	4	0.4%
References	64	7.1%
Total	**899**	**100%**

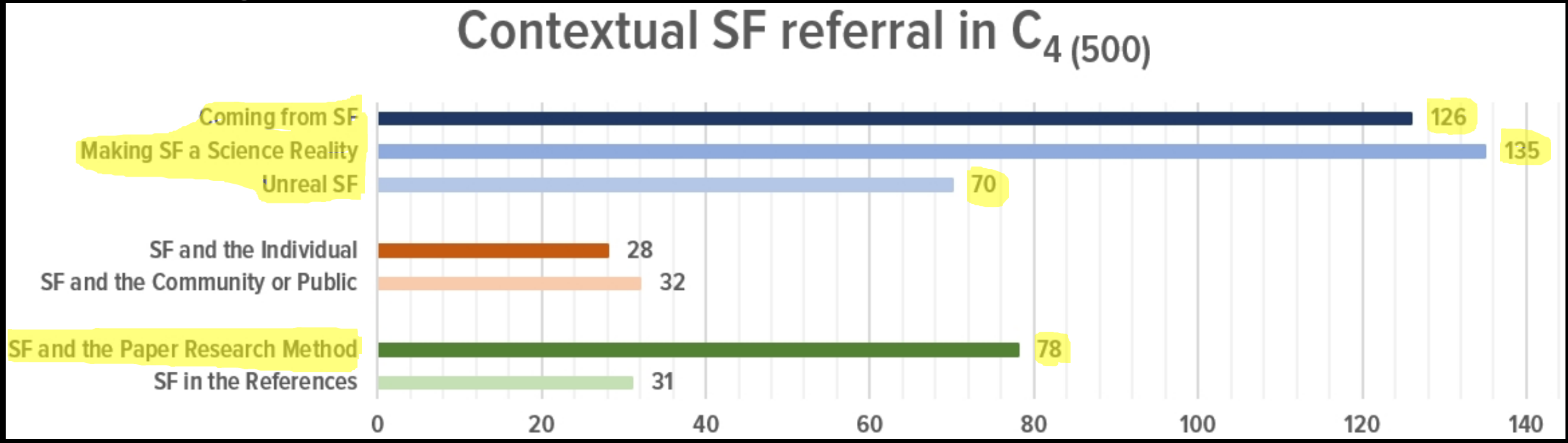
Results

Opinionated research contributions dominate

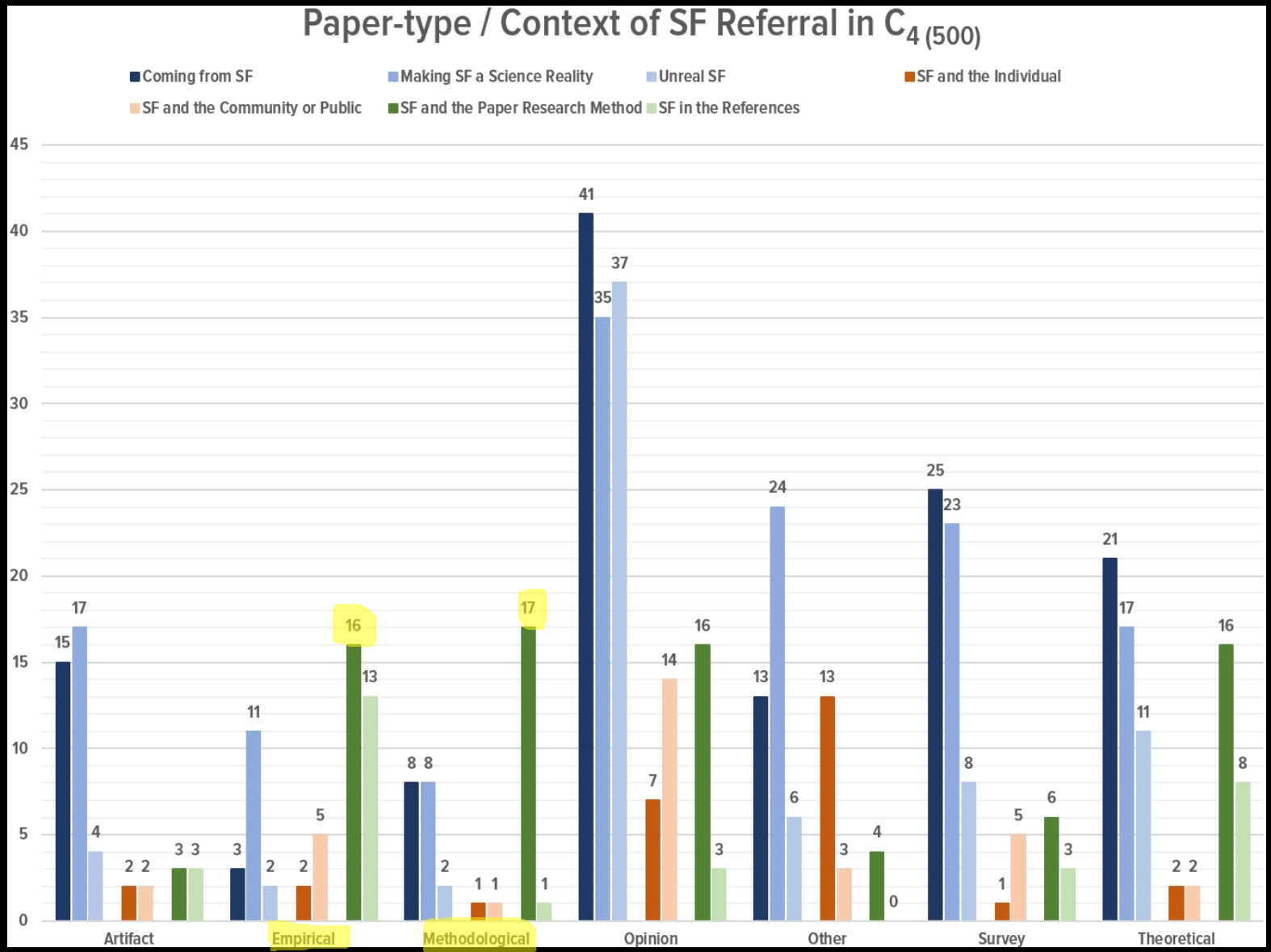


Results

Scientists use SF most often in the context of drawing inspiration and innovation into the research paper



Results



Empirical and methodological-type papers

→ SF as part of the Research Method

Remaining paper types

→ SF to draw inspiration and innovation into the research paper

Results

	Author Name	bin. ref.	% of bin. ref.
1	Isaac Asimov	28	13.9%
2	Arthur C. Clarke	19	9.5%
3	William Gibson	15	7.5%
4	Robert Heinlein	9	4.5%
5	Jules Verne	7	3.5%

`The big three' of the first golden age of SF:

—Isaac Asimov
—Arthur C. Clarke
—Robert Heinlein

	Books, Novels, Short Stories	bin. ref.	% of bin. ref.
1	Neuromancer	10	4.5%
2	Astounding Science Fiction	7	3.1%
3	Runaround	7	3.1%
4	Snow Crash	6	2.7%
5	Hitchhikers' Guide to the Galaxy (novel)	4	1.8%

The works of the most prominent SF writers

Results

	SF Movie, Show	bin. ref.	% of bin. ref.
1	Star Trek	28	13.7%
2	2001: A Space Odyssey (movie)	23	11.2%
3	The Terminator	13	6.3%
4	Minority Report	12	5.9%
5	Star Wars	11	5.4%

The `big SF franchises' and their characters

— Star Trek
— Terminator
— Star Wars

	SF Characters	bin. ref.	% of bin. ref.
1	HAL 9000	11	20.0%
2	R2-D2	3	5.5%
3	Dick Tracy	3	5.5%
4	Captain Kirk	2	3.6%
5	Borg	2	3.6%

— HAL 9000 stands out
— More `robots/AIs' than 'human characters'

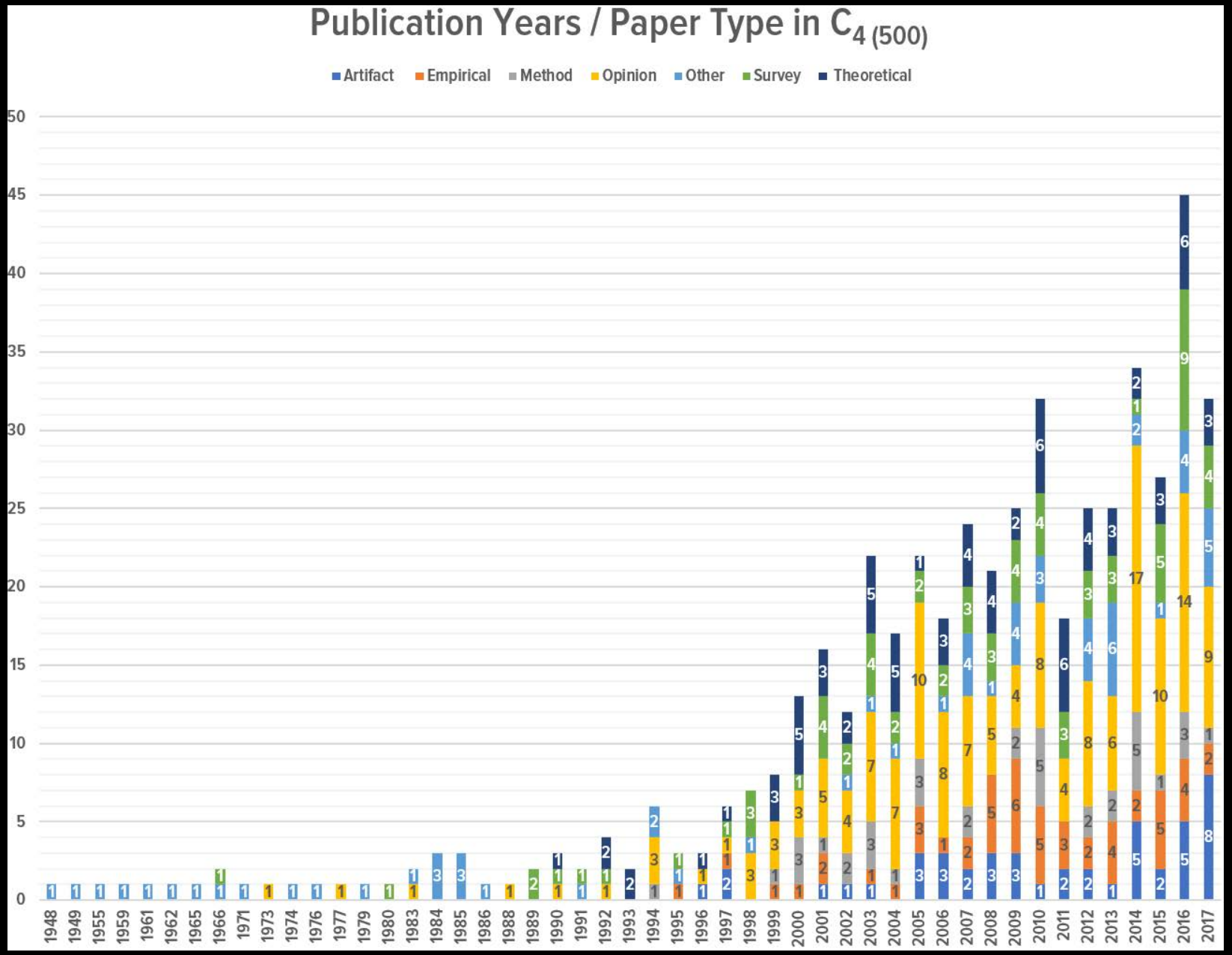
Results

	Unique SF Particulars in $C_{4\,(500)}$
SF Authors	112
SF Writings	78
SF Movies	115
SF Characters	39

Table A.5 continued from previous page

	SF Movie, Show	abs. ref.	bin. ref.	% of bin. ref.
20	A.I.: Artificial Intelligence	3	2	1.0%
21	Conquest of Space	3	2	1.0%
22	E.T. the Extra-Terrestrial	3	2	1.0%
23	Knight Rider	3	2	1.0%
24	Transformers	3	2	1.0%
25	Aliens	2	2	1.0%
26	Avatar	2	2	1.0%
27	Doctor Who	2	2	1.0%
28	Ender's Game	2	2	1.0%
29	Harry Potter (movie)	2	2	1.0%
30	James Bond	2	2	1.0%
31	RoboCop	2	2	1.0%
32	Sleeper	2	2	1.0%
33	Stargate	2	2	1.0%
34	Starship Troopers	2	2	1.0%
35	The Man from U.N.C.L.E	2	2	1.0%
36	Total Recall	2	2	1.0%
37	Dark Star	8	1	0.5%
38	Self/Less	6	1	0.5%
39	Black Mirror	5	1	0.5%
40	Frankenstein (movie)	5	1	0.5%
41	Hollow Man	3	1	0.5%
42	Jurassic Park	3	1	0.5%
43	Men into Space	3	1	0.5%
44	Blake's 7	2	1	0.5%
45	Chrysalis	2	1	0.5%
46	Demon Seed	2	1	0.5%
47	The Abyss	2	1	0.5%
48	The Martian	2	1	0.5%
49	Wonder Woman	2	1	0.5%
50	2010: The Year We Make Contact	1	1	0.5%
51	Abre Los Ojos	1	1	0.5%
52	Airwolf	1	1	0.5%
53	Animatrix	1	1	0.5%

Results



— **1948 – 1986**

mostly other-type contributions

— **Until 1990**

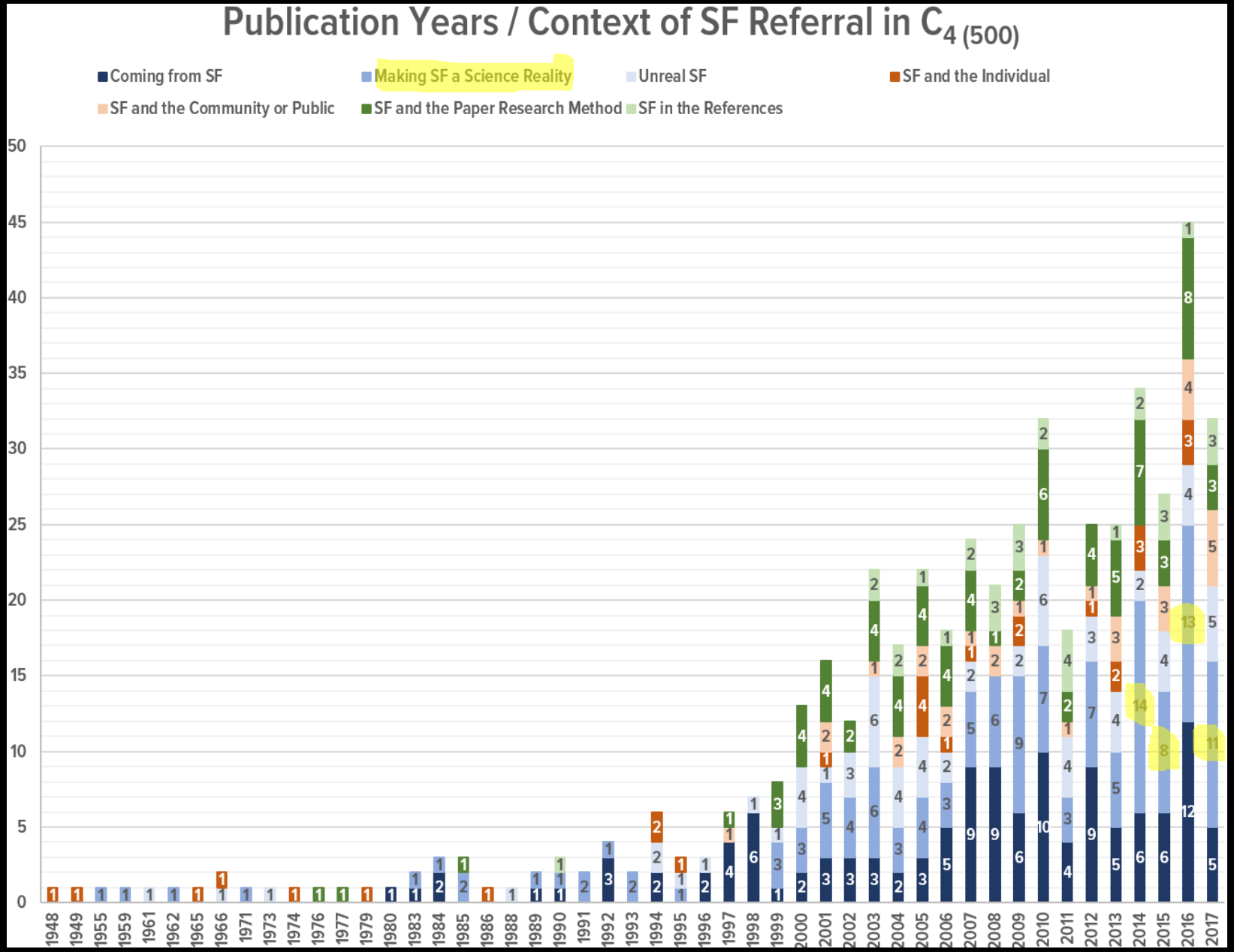
only three types:
other / opinion / survey

— **2000s–**

spread of SF referrals across all paper types

→ **`Diversification' of the usage of SF over time**

Results

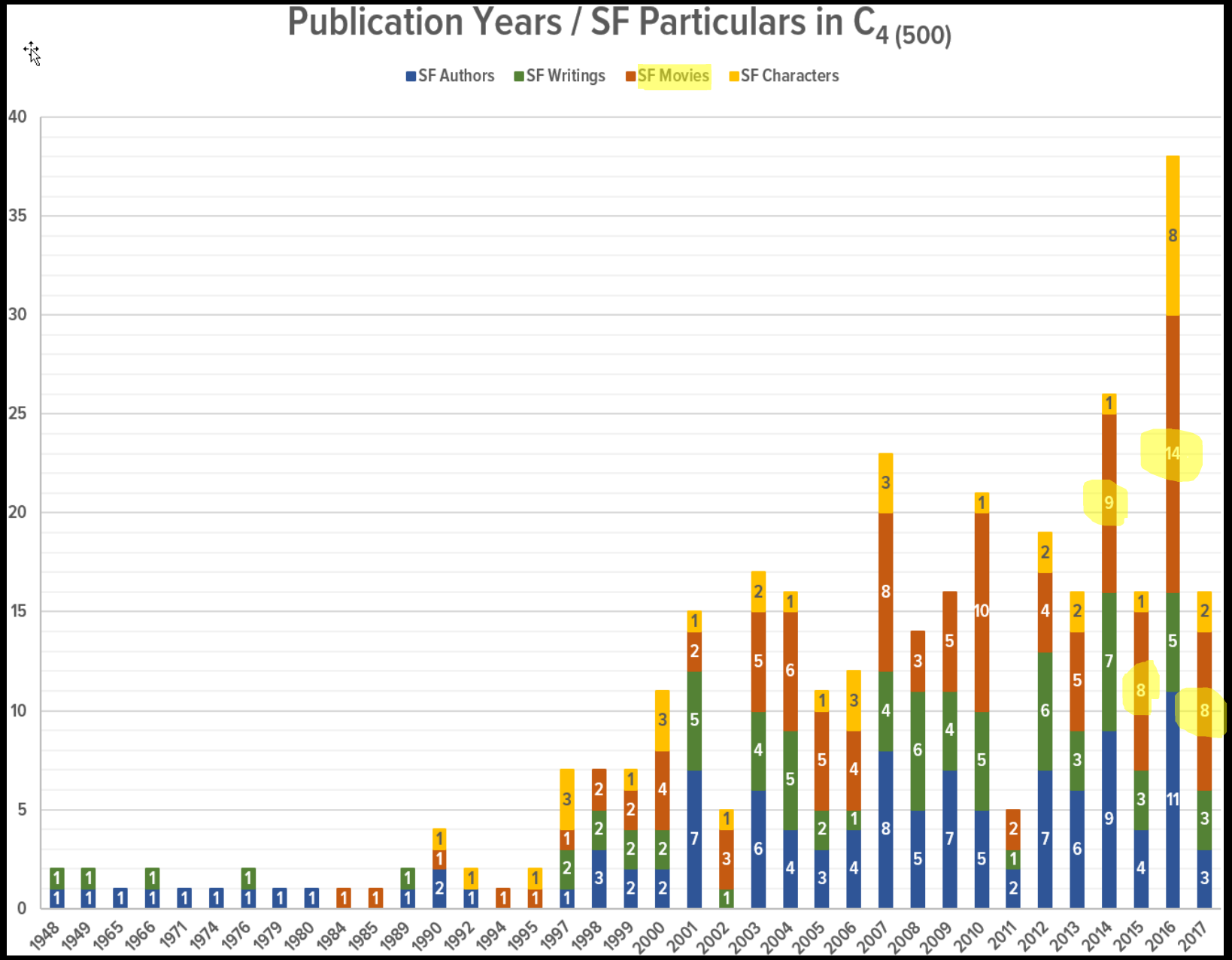


2014-2017

‘Making SF a Science Reality’ is the most often found attribute per year

→ Researchers approximate SF concepts more often toward a state realization instead of referring to them as sources of inspiration or unfeasible imaginations.

Results



1948-1980
Only SF authors and writings

1984
The first SF movie – Star Trek – is referenced in a other-type paper on CGI and special effects in

1990
the first SF character – James T. Kirk – is referenced in a paper on speech recognition in.

2014-2017
SF Movies appear the most often in records

→ Transition from written toward visual SF ?

Tracing a SF concept in real-world R&D

1988 S. B. Little. "The future of technical communication instruction".

``…natural language, vision processing, and voice, researchers are providing solutions to problems that only a decade ago would have sounded like science fiction […] current technology in these areas of human intelligence is limited […] to small vocabularies, recognition of isolated words rather than continuous speech, and speaker dependency, where each user's voice must be stored."

1994 L. V. Kirkland and J. S. Dean. "ATE enabling technologies: Present and future.

``Being able to talk interactively with a computer has been a dream for decades and, until recently, has been considered science fiction […] this capability may soon become science fact."

2007 M. Muhlhauser. "Making Sense of Ubiquitous Media style

``In fact, natural language dialogues are a high priority challenge as, e.g., a look at IT centric science fiction can tell: […] Lately however, NLP based techniques for 'question answering' (as opposed to formal queries) improved considerably."

2014 K. Ricanek. "Beyond Recognition: The Promise of Biometric Analytics".

``The notion of voice recognition, and hence control, dates back to early science fiction […] Systems are now being deployed that re-purpose the voice recognition process to better understand the speaker's emotional state, honesty, concentration level, and other attributes that define a person's character and personality."

Discussion & Limitations

Discussion

- Most often one (1) SF referral per record – 77% in $C_{4\ (500)}$
- Most often one (1) SF referrals in the body – 85% in $C_{4\ (500)}$
- Opinionated records represent the majority – 31% in $C_{4\ (500)}$

- Most SF referrals to draw innovation in the paper – 66% in $C_{4\ (500)}$
  - Coming from SF – 27% in $C_{4\ (500)}$
  - Making SF a Science Reality – 25% in $C_{4\ (500)}$
  - Unreal SF – 14% in $C_{4\ (500)}$

- SF and the Research Paper Method – 16% in $C_{4\ (500)}$
  - SF Prototyping, Technology Forecasting, design research (no Design Fiction)
  - SF in K12, summer programs, introductory CS courses

- SF Authors and Writings – The big three of the `Golden Age' of SF
- SF Movies and Shows – The big franchises
- Sf Characters – HAL9000, mostly robots

- Unique referrals – 115 SF Movies versus 78 SF Writings (however, 112 SF Authors)
- IEEE *Xplore* in April 2019: 4.85 mil. - 3859 records for a FT search for "science fiction - >0.1%

Limitations

Qualitative research is subjective and prone to interpretation bias

→ Present quantitative (frequency analysis) and quality data (interpretative data)

Search and retrieval approach for one single term

→ Inclusive approach to retrieve as many records as possible

Dataset reduction from 2784 to 500 records.

→ Distribution patterns of all sets over the years re-ensemble each other

Inter-rater reliability

→ Values not as desired (e.g. α is not ≥ 0.8), but acceptable

Conclusions & Future Work

Conclusions & Future Work

In conclusion

- The story of SF in CS / HCI research is a niche, but rich, topic.
- A unique and differentiating factor in SF for CS / HCI are the stories and diegetic prototypes
- SF covers a broad range from technology ethics to interaction design, from device innovation to smart environments, AI, robots, AR, VR and medical device design.
- In addition, SF can play a role in CS / STEM education
- It seems SF deserves way more credit than it actually is granted in computer science communication, however, this might change in the future

Implications / Future Work

- Validation of the innovation of SF through empirical data (e.g. interviewing researchers)
- Extension / Creation of a framework which connects SF, Research and Science output
- Validation of the methodology and results through different searches, for example for the most popular SF Particulars
- Analysis and topic mapping of the SF technologies (not presented here)

Fin

Aloha. Thank you very much
Questions / Comments ?

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