

1

2 ***Supplementary Material:***

3 **Theme Enrichment Analysis: A Statistical Test for**
4 **Identifying Significantly Enriched Themes in a List of**
5 **Stories with an Application to the Star Trek**
6 **Television Franchise**

SUPPLEMENTARY NOTE 1

7 Star Trek has long been an important part of American popular culture ¹, and remains popular among
 8 sci-fi enthusiasts the world over ². Those acquainted with the Star Trek science fiction media franchise will
 9 know that in the main it comprises seven television series and thirteen feature films ³. Figure S1 shows
 10 an overview. The first series, which is known as *Star Trek: The Original Series* (or simply *TOS*), began
 11 airing in 1966 and ran for 80 mostly delightful episodes. It depicts the adventures of Captain James T. Kirk
 12 and his crew aboard the starship Enterprise on a five-year mission to explore the galaxy. The mission was
 13 temporarily suspended three years in when the show was cancelled in 1969 on account of poor ratings.
 14 But the Enterprise crew saw their mission through to completion in *Star Trek: The Animated Series* (*TAS*),
 15 which ran from 1973 to 1974 in two seasons consisting of 22 somewhat less delightful episodes. Six
 16 feature films following the TOS/TAS cast on subsequent adventures were released in the years from 1979
 17 to 1991. From TOS was spawned the spin-off television series *Star Trek: The Next Generation* (*TNG*)
 18 which ran from 1987 to 1994 in seven seasons consisting of 178 episodes. It is set a generation or so
 19 after Captain Kirk's five-year mission. In the series, a fresh cast of characters is led by Captain Jean-Luc
 20 Picard on a similar mission of galactic exploration aboard a newfangled starship Enterprise. There are four
 21 associated feature films. Four subsequent television series have been produced: *Star Trek: Deep Space*
 22 *Nine* (1993–99), *Star Trek: Voyager* (1995–2001), and *Star Trek: Enterprise* (2001–05). Three reboot
 23 films based on TOS have also been released to date, and a seventh television series, *Star Trek: Discovery*
 24 (2017–), is presently being aired.

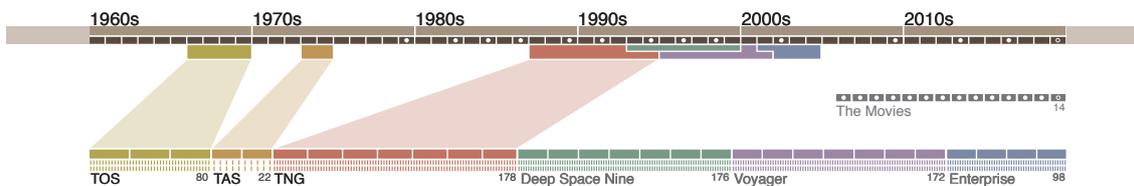


Figure S1: The Star Trek television series and film franchise overview.

¹ Hayes, N. (2016). Star Trek and the kiss that changed TV. URL: <http://www.bbc.com/culture/story/20160707-star-trek-turns-50-why-it-was-subversive-and-groundbreaking>. [Online; posted 7-July-2016]

² STARFLEET, the International Star Trek Fan Association, Inc. (2017). URL: <http://sfi.org/>. [Online; accessed 1-December-2017]

³ Star Trek. (2017). URL: <http://www.startrek.com/>. [Online; accessed 1-December-2017]

SUPPLEMENTARY NOTE 2

- 25 This supplementary note contains a description of the Klingon storyset from the case study of Subsection 4.1.
 26 The stories are summarized below in Table S1. The criteria for episode inclusion is simply that the aliens
 27 known as the Klingons are featured throughout the episode in a way that is central to the story.

Table S1. The Klingon storyset story IDs, titles, and brief episode summaries. Story ID format consists of a series identifier, followed by a season number, followed by an episode number.

Story ID	Title	Summary
TOS1x27	Errand of Mercy	The Enterprise is tasked to protect the Organians from Klingon aggression, but Kirk is left baffled when his offer of help is rejected.
TOS2x03	Friday's Child	On a mission to secure a mining agreement on Capella IV, the Enterprise crew arrive to find that the Klingons have beaten them to the punch.
TOS2x13	The Trouble with Tribbles	Tribbles disrupt a dispute between the Federation and the Klingon Empire over the ownership of a lucrative planet.
TOS2x16	A Private Little War	Kirk must decide how to save a primitive race of hill-people from the technological interference of the Klingons.
TOS3x11	Day of the Dove	An incorporeal alien that feeds on negative emotions drives the crew of the Enterprise into brutal conflict with the Klingons.
TOS3x22	The Savage Curtain	Rock monsters force Kirk and Spock to team with Abraham Lincoln in an epic battle to the death against a team of legendary villains.
TAS1x05	More Tribbles, More Troubles	The Enterprise crew become entangled in an ongoing conflict between the Klingons and the notorious tribble peddler Cyrano Jones.
TAS1x12	The Time Trap	The Enterprise and a Klingon battlecruiser are drawn into a timeless dimension where fellow castaways from all the major alien races of the galaxy live together in peace.
TNG1x20	Heart of Glory	A trio of Klingon fugitives seeking battle attempt to hijack the Enterprise, and ask Worf to join them.
TNG2x08	A Matter Of Honor	Riker is assigned to a Klingon vessel via an officer exchange program between the Federation and the Klingon Empire.
TNG2x20	The Emissary	Worf's old flame K'Ehleyr comes aboard Enterprise to help deal with a ship of Klingon sleeper agents unaware they are no longer at war.
TNG3x15	Yesterday's Enterprise	The Enterprise-D's reality is altered into one where the Federation is in a desperate war with the Klingon Empire.
TNG3x17	Sins of the Father	Worf stands trial to prove his father's innocence when the Klingon High Council accuses the family patriarch of treason.
TNG4x07	Reunion	K'Ehleyr returns to the Enterprise to help mediate a Klingon power dispute and inform Worf that he has fathered her a son.
TNG4x21	The Drumhead	An obsessed Starfleet admiral pursues a witch-hunt for suspected Romulan spies aboard the Enterprise.
TNG4x24	The Mind's Eye	The Romulans condition Geordi to assassinate a Klingon governor.
TNG4x26	Redemption	Worf leaves the Enterprise to fight in a brutal Klingon civil war.
TNG5x01	Redemption II	The Federation ships intervenes in an ongoing Klingon civil war, resulting in Gowron's installation as Chancellor.
TNG5x16	Ethics	When Worf is paralyzed in a freak accident, his sense of honor compels him to choose between between euthanasia and a risky medical procedure.
TNG6x13	Aquiel	Geordi becomes infatuated with an alien Starfleet officer who is suspected of murdering her colleague while stationed at a far-flung space station.
TNG6x16	Birthright, Part I	Worf is told on Deep Space Nine that his father is alive, and being held by the Romulans at a secret prison camp.
TNG6x17	Birthright, Part II	When Worf is captured and taken to a Romulan operated Klingon refugee camp, he tries to teach the refugees the ways of the warrior.
TNG6x20	The Chase	Picard tries to solve an ancient genetic mystery uncovered by his archaeological mentor, Richard Galen, but soon finds that the Klingons, Romulans, and Cardassians are already hot on the trail.
TNG6x22	Suspicious	Beverly risks her career to vindicate a murdered Ferengi scientist in the eyes of his Klingon and Vulcan peers.
TNG6x23	Rightful Heir	Worf experiences a crisis of faith, and travels to a Klingon holy site where the mythic figure Kahless returns to lead the Klingon people.
TNG7x21	Firstborn	Worf and a mysterious family friend attempt to convince Worf's son Alexander to embrace his warrior heritage.

SUPPLEMENTARY NOTE 3

28 This supplementary note contains tables and a figure related to the comparison of the hypergeometric test
 29 with TF-IDF scoring as described in Section 4.4 of the main paper.

Table S2. TF-IDF scores for themes in Klingon-centric episodes relative to *TOS/TAS* and *TNG* backgrounds, respectively.

Rank	Theme	Domain	k/K	TF-IDF
Top 20 Enriched Themes in <i>TOS/TAS</i> Klingon Episodes				
1	über-belligerent alien		5/5	1.88
2	diplomatic negotiating		4/7	1.34
3	culturally distinguished life form		6/20	1.22
4	man vs. beast		3/5	1.13
5	diplomacy		5/19	1.05
6	pacifism		3/7	1.00
7	military tactics		3/7	1.00
8	conflict over a shared resource		2/2	0.98
9	atrocities of war		2/2	0.98
10	tribble		2/2	0.98
11	war		5/22	0.96
12	miscellaneous life form		3/8	0.95
13	imperialistic society		3/8	0.95
14	the art of war		5/23	0.93
15	cross cultural understanding		4/16	0.93
16	humility		3/9	0.91
17	conflict of moral codes		2/3	0.88
18	patience		3/10	0.87
19	transnational social issue		6/32	0.87
20	temperance		2/4	0.81
Top 20 Enriched Themes in <i>TNG</i> Klingon Episodes				
1	über-belligerent alien		14/14	1.97
2	honor		13/18	1.65
3	culturally distinguished life form		14/53	0.93
4	the need for cultural heritage		5/8	0.86
5	rage		7/23	0.79
6	belonging		7/27	0.73
7	father and son		6/21	0.71
8	the art of war		6/24	0.66
9	loyalty		7/33	0.65
10	surprise		6/27	0.62
11	wrath		8/44	0.62
12	guilt and evidence		4/11	0.62
13	cooperation		5/20	0.60
14	diligence		7/38	0.60
15	racism in society		3/5	0.59
16	facing wrongful accusations		3/5	0.59
17	human need		9/54	0.59
18	disgust		5/22	0.58
19	personal conviction		5/23	0.57
20	the lust for power		3/7	0.54

Table S3. TF-IDF scores for themes in each Star Trek television series relative to a *TOS/TAS/TNG* background.

Rank	Theme	Domain	k/K	TF-IDF
Top 20 TOS Enriched Themes				
1	wrath		41/85	0.61
2	gender issues		26/46	0.58
3	female stereotype		19/24	0.58
4	rage		27/50	0.58
5	alternate society		45/100	0.58
6	alternate life		39/87	0.57
7	existential risk		37/83	0.56
8	what if I faced an incredible situation		30/64	0.55
9	way of life		24/45	0.55
10	past and present moral controversies		24/49	0.52
11	man-made existential risk		22/43	0.51
12	ethics		31/74	0.51
13	personal ethical dilemma		45/112	0.51
14	serenity		21/41	0.50
15	disagreeable characteristic		48/121	0.50
16	social order		22/48	0.48
17	lust		28/70	0.48
18	compassion		25/60	0.48
19	personal practical dilemma		26/64	0.48
20	amicable disposition		45/119	0.48
Top 10 TAS Enriched Themes				
1	earth-life inspired life form		6/15	0.80
2	miscellaneous life form		5/13	0.70
3	life-support belt		3/3	0.62
4	what if my life were different		6/38	0.54
5	alternate society		11/100	0.51
6	crackpot theory		5/30	0.51
7	existential risk		9/83	0.49
8	man vs. beast		3/8	0.48
9	alternate life		9/87	0.48
10	what's out there		6/51	0.46
Top 20 TNG Enriched Themes				
1	familial love		49/59	0.43
2	pride		51/64	0.43
3	familial relations		81/111	0.42
4	family affairs		91/126	0.41
5	growing up		40/47	0.40
6	culturally distinguished life form		53/73	0.40
7	group interaction		66/96	0.40
8	heavenly virtue		105/144	0.39
9	human nature		57/83	0.39
10	AI technology		45/61	0.39
11	state of mind		81/120	0.39
12	views and customs		88/129	0.38
13	fictional apparatus		54/80	0.38
14	annoyance		56/84	0.38
15	virtual reality room		31/32	0.38
16	introspection		106/149	0.38
17	android		33/38	0.37
18	coping with an affliction		46/67	0.37
19	agreeable characteristic		96/142	0.37
20	intercultural relations		95/141	0.37

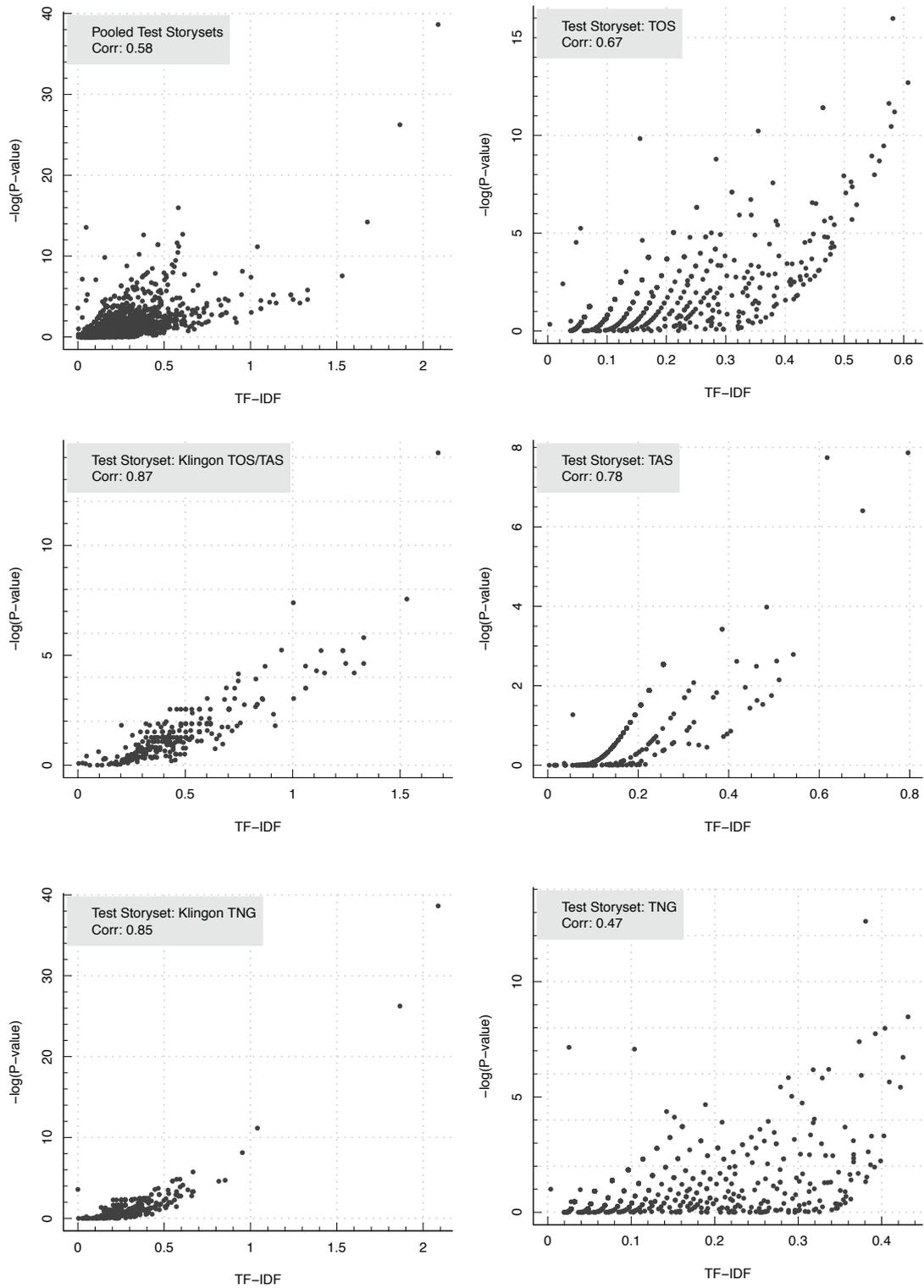


Figure S2: Scatterplots of TF-IDF scores versus hypergeometric test negative logarithm p -values for themes from each enrichment analysis from Sections 4.1 and 4.2 of the main text. The upper left scatterplot shows the pooled results from all five cases.