

Lecture 13:

Heterogeneous Data &

Heterogeneous Users

CMSC 25910

Spring 2023

The University of Chicago



Good Intentions

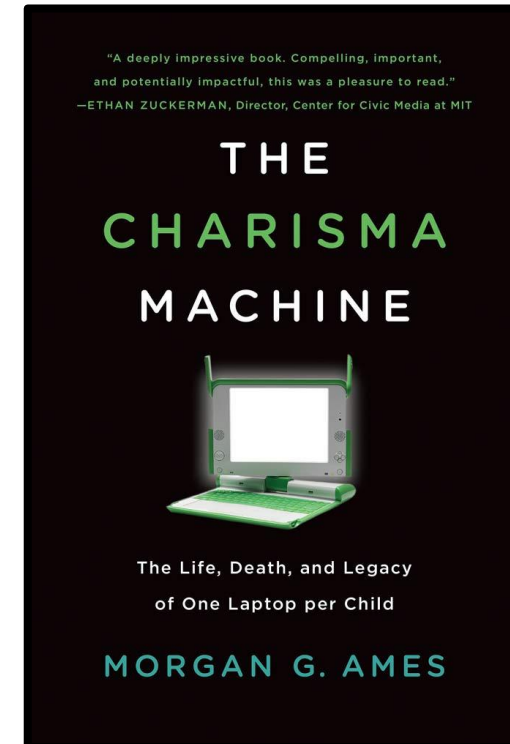
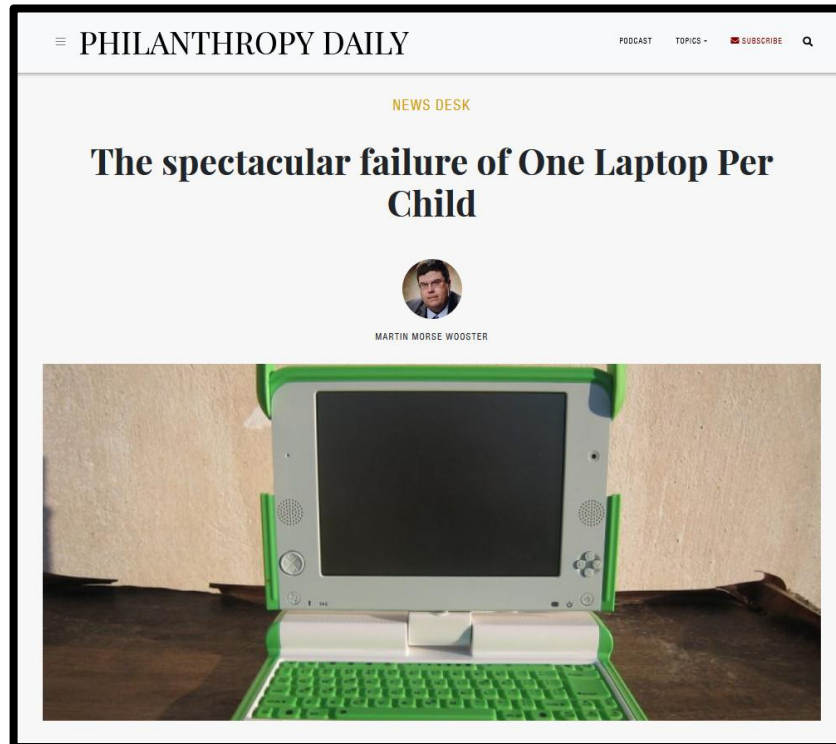
One Laptop Per Child (OLPC)

- Project centered in the MIT Media Lab ~2005
 - Funding came from companies like AMD, eBay, Google, Marvell, etc.
- Goal: Transform education around the world in part by distributing electronic devices around the world



Failure of One Laptop Per Child (OLPC)

- US-centric worldview; expensive; focus on computers (to the detriment of other concerns); minimal availability of software; problems with maintainability; minimal training/infrastructure; over-adherence to FOSS; negative environmental impacts; bugs



Interfaces and data diversity

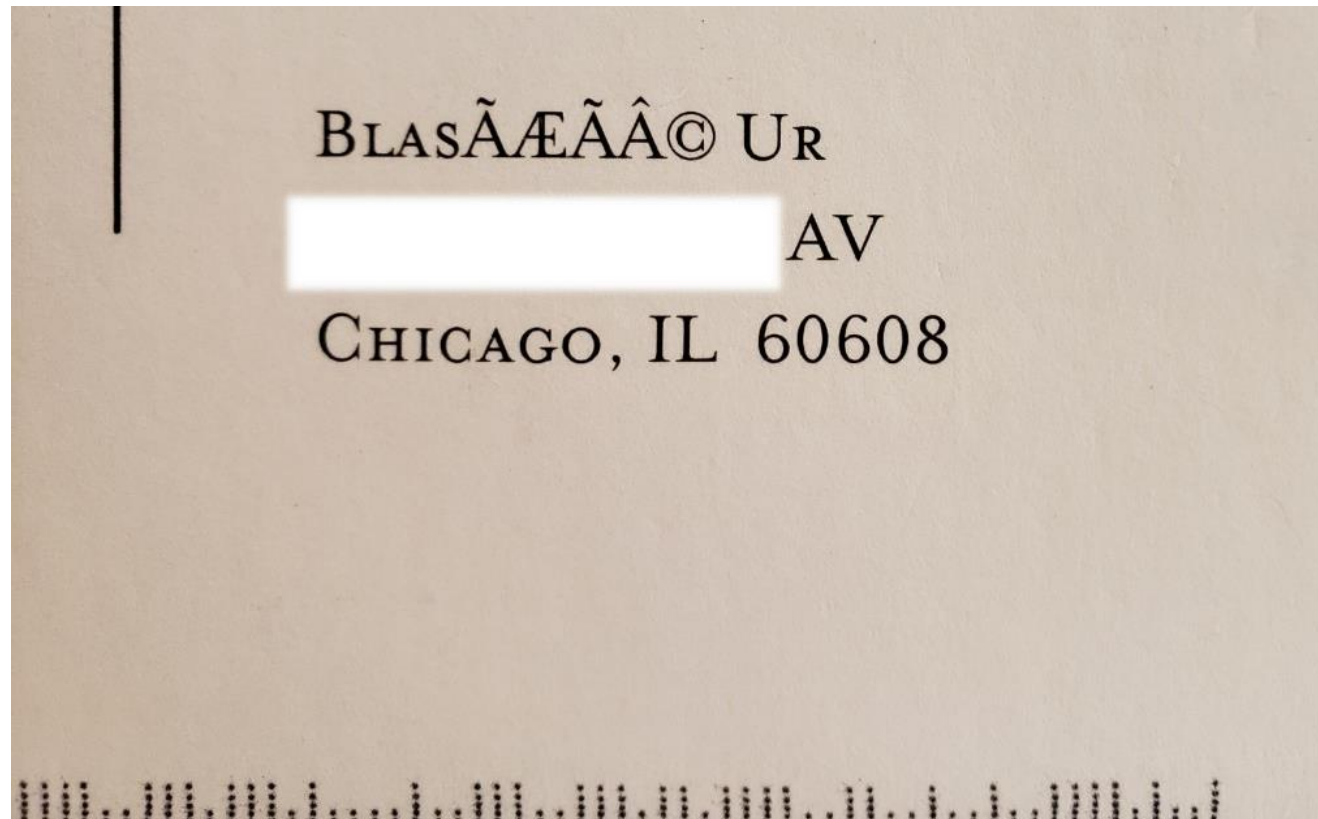
Data validation

- Are we considering all possible formats of the data?
- Are we forcing one answer when more than one applies?

The screenshot displays the 'Ethics20 Project Preferences' interface. At the top, it shows 'iQ Score: Great' and 'Published' status. The main area lists three questions: Q1 'Your name:', Q2 'Your UChicago email address (e.g., blase@uchicago.edu):', and Q3 'How excited or not excited are you to do your class project in each area below?'. Q1 is selected with a checkbox. To the right, a 'Change Question Type' dropdown is set to 'Text Entry'. Below this, 'Text Type' options include 'Single Line' (selected), 'Multi Line', 'Essay Text Box', 'Form', and 'Password'. 'Validation Options' include 'Force Response' (checked) and a 'Request Response' dropdown. A red box highlights the 'Request Response' dropdown menu, which lists: 'Minimum Length', 'Maximum Length', 'Character Range', 'Content Validation', and 'Custom Validation' (highlighted in blue). At the bottom, a scale for Q3 is shown with labels: 'Very excited to work on it', 'Excited to work on it', 'Somewhat excited to work on it', and 'Not excited'.

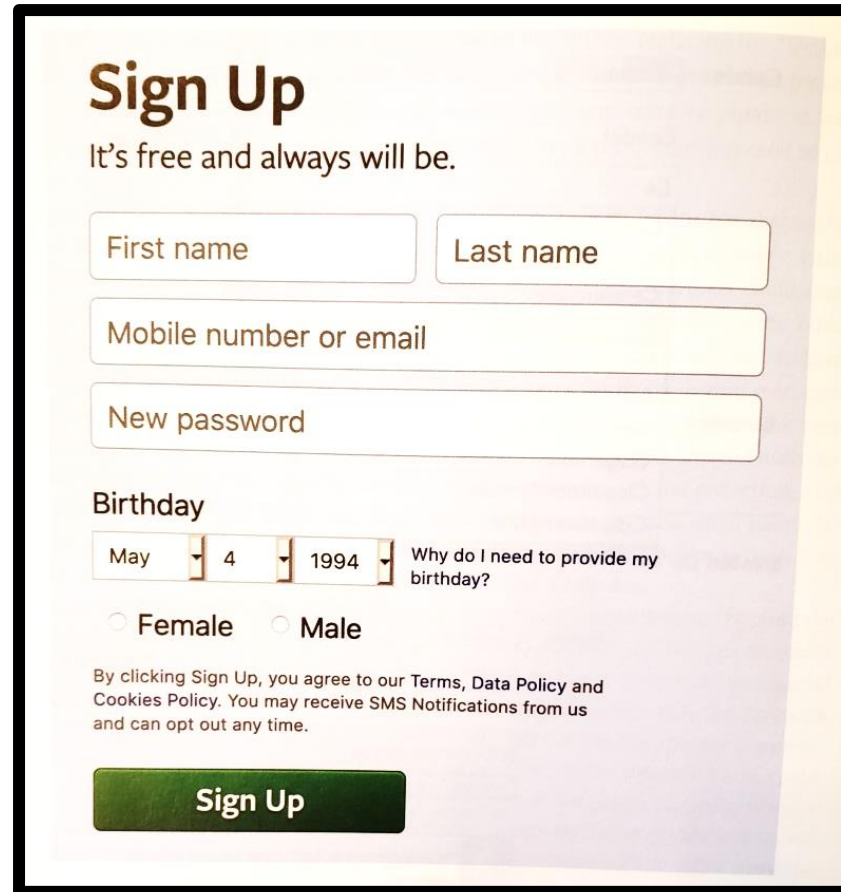
Data validation

- Are we properly surfacing data errors?

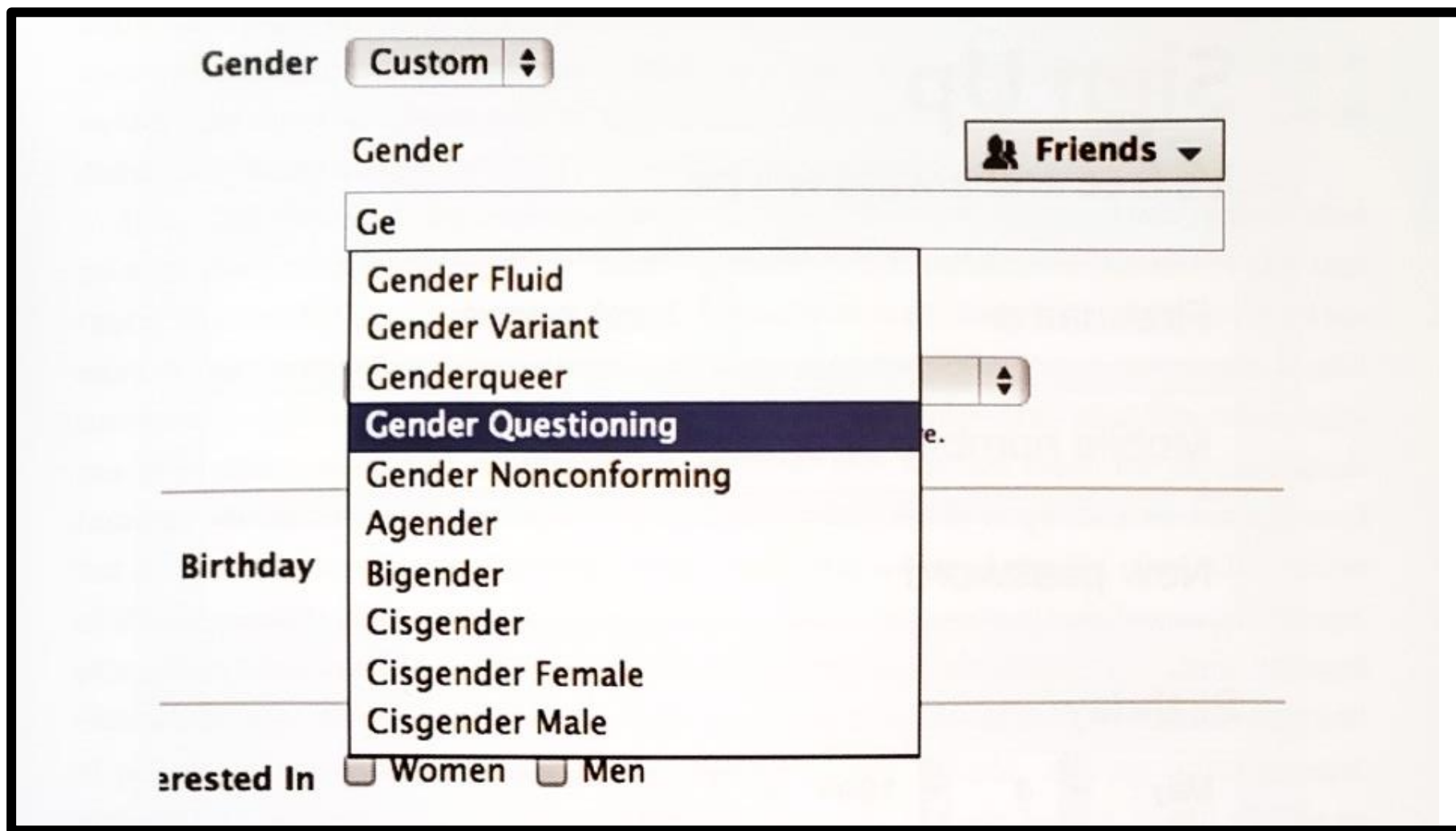


Interfaces forcing an identity

- Facebook required a binary gender upon initial registration

A screenshot of the Facebook 'Sign Up' form. The form is titled 'Sign Up' in a large, bold, brown font. Below the title, it says 'It's free and always will be.' in a smaller, brown font. The form contains several input fields: 'First name', 'Last name', 'Mobile number or email', and 'New password'. Below these fields is a 'Birthday' section with three dropdown menus showing 'May', '4', and '1994'. To the right of these dropdowns is a link that says 'Why do I need to provide my birthday?'. Below the birthday section are two radio buttons labeled 'Female' and 'Male'. At the bottom of the form, there is a green button labeled 'Sign Up'. Above the button, there is a line of small text: 'By clicking Sign Up, you agree to our Terms, Data Policy and Cookies Policy. You may receive SMS Notifications from us and can opt out any time.'

Facebook's first attempt to do better



A screenshot of Facebook's profile editing interface, specifically the gender selection dropdown menu. The dropdown is open, showing a list of gender options. The option "Gender Questioning" is highlighted in dark blue. Other visible options include "Gender Fluid", "Gender Variant", "Genderqueer", "Gender Nonconforming", "Agender", "Bigender", "Cisgender", "Cisgender Female", and "Cisgender Male". The background shows parts of the profile editor, including the "Gender" label, a "Custom" button, a "Friends" button, and a "Birthday" field.

Gender Custom

Gender Friends

Ge

Gender Fluid

Gender Variant

Genderqueer

Gender Questioning

Gender Nonconforming

Agender

Bigender

Cisgender

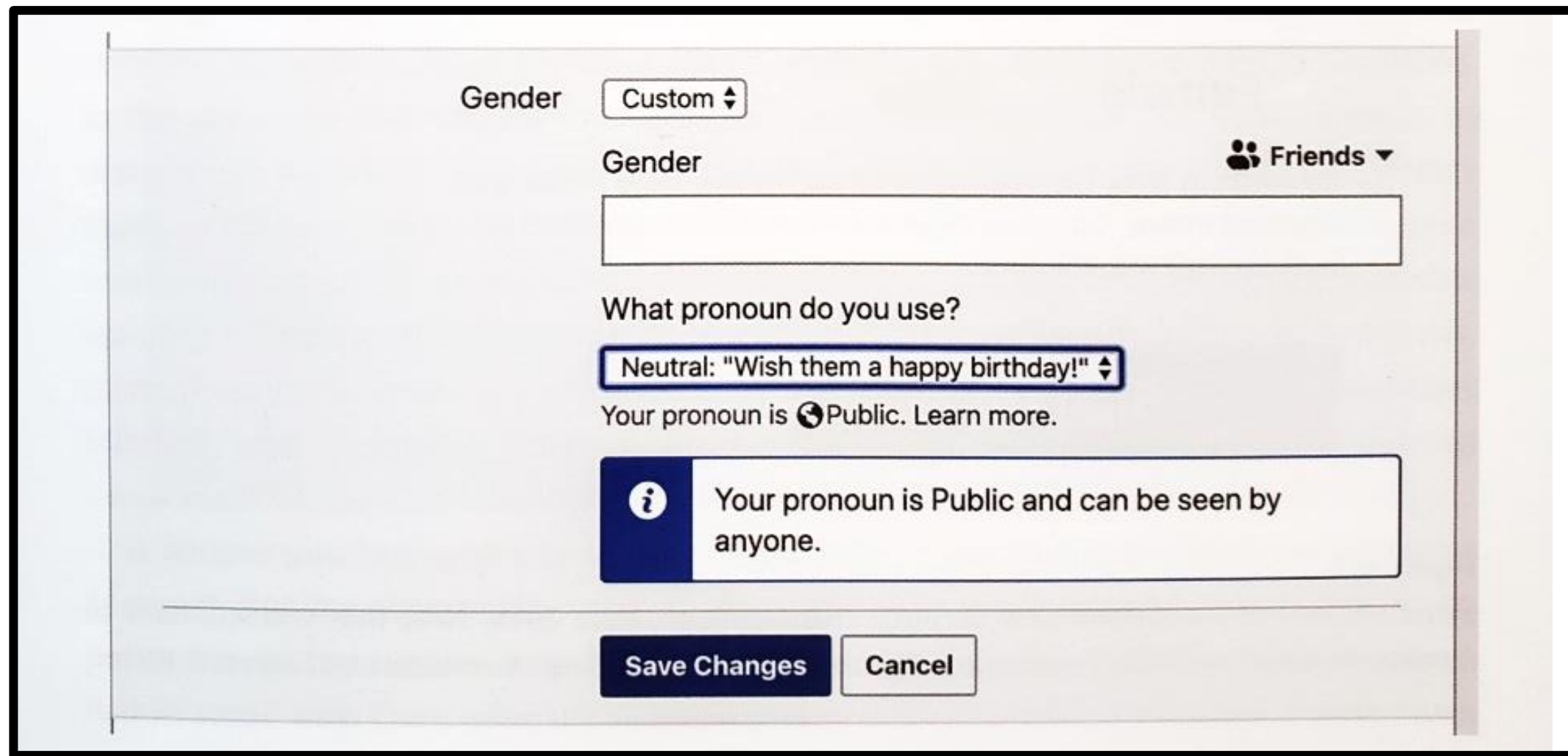
Cisgender Female

Cisgender Male

Birthday

Interested In ☐ Women ☐ Men

Facebook's improved attempt (free text)



The image shows a screenshot of Facebook's profile settings for gender and pronouns. At the top, the 'Gender' section has a dropdown menu set to 'Custom'. Below this is a text input field for 'Gender'. To the right of the input field is a 'Friends' dropdown menu. Below the 'Gender' section is the 'What pronoun do you use?' section, which has a dropdown menu set to 'Neutral: "Wish them a happy birthday!"'. Below this is a line of text: 'Your pronoun is Public. Learn more.' Below this is a blue information box with a white 'i' icon and the text: 'Your pronoun is Public and can be seen by anyone.' At the bottom of the form are two buttons: 'Save Changes' and 'Cancel'.

Gender Custom ▾

Gender Friends ▾

What pronoun do you use?

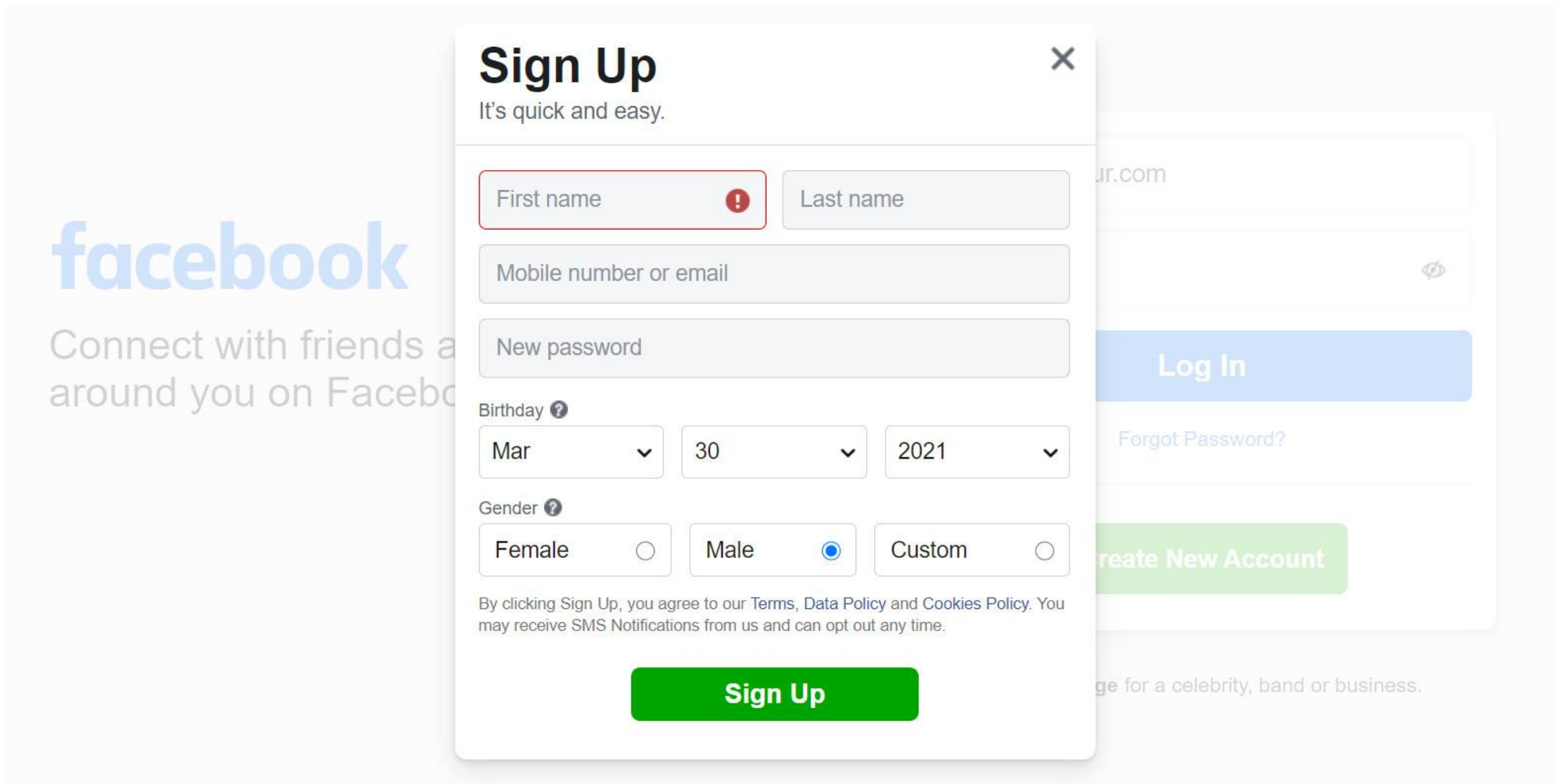
Neutral: "Wish them a happy birthday!" ▾

Your pronoun is Public. [Learn more.](#)

i Your pronoun is Public and can be seen by anyone.

Save Changes Cancel

Facebook's current registration interface



The image shows a Facebook registration modal titled "Sign Up" with the subtitle "It's quick and easy." The modal is overlaid on a blurred background of the Facebook login page. The registration form includes fields for "First name" (with a red error icon), "Last name", "Mobile number or email", and "New password". Below these are dropdowns for "Birthday" (set to Mar 30, 2021) and "Gender" (set to Male). A green "Sign Up" button is at the bottom. The background page shows the Facebook logo, a "Log In" button, and a "Create New Account" button.

Sign Up
It's quick and easy.

First name  Last name

Mobile number or email

New password

Birthday ?
Mar 30 2021

Gender ?
Female Male Custom

By clicking Sign Up, you agree to our [Terms](#), [Data Policy](#) and [Cookies Policy](#). You may receive SMS Notifications from us and can opt out any time.

Sign Up

facebook

Connect with friends and groups you know around you on Facebook.

Log In

Forgot Password?

Create New Account

Sign up for a celebrity, band or business.

Facebook's current registration interface

The image shows a Facebook 'Sign Up' modal window. The title is 'Sign Up' with a close button (X) in the top right. Below the title is the text 'It's quick and easy.' The form contains several input fields: 'First name' (highlighted with a red border and a red exclamation mark icon), 'Last name', 'Mobile number or email', and 'New password'. Below these are dropdown menus for 'Birthday' (set to Mar, 30, 2021) and 'Gender' (with radio buttons for Female, Male, and Custom, where Custom is selected). A dropdown menu for 'Select your pronoun' is open, showing options: 'Select your pronoun', 'She: "Wish her a happy birthday!"', 'He: "Wish him a happy birthday!"' (highlighted in blue), and 'They: "Wish them a happy birthday!"'. A red callout bubble points to this dropdown with the text 'Please select your pronoun.' At the bottom of the modal is a green 'Sign Up' button. In the background, the Facebook logo and the text 'Connect with friends and groups you know around you on Facebook' are visible. To the right, a 'Log In' button and a 'Forgot Password?' link are shown. At the bottom right, there is a 'Create New Account' button and a link for 'Sign up for a celebrity, band or business.'

Sign Up X
It's quick and easy.

First name ! Last name

Mobile number or email

New password

Birthday ?
Mar 30 2021

Gender ?
Female Male Custom

Please select your pronoun.

Select your pronoun
Select your pronoun
She: "Wish her a happy birthday!"
He: "Wish him a happy birthday!"
They: "Wish them a happy birthday!"

Sign Up

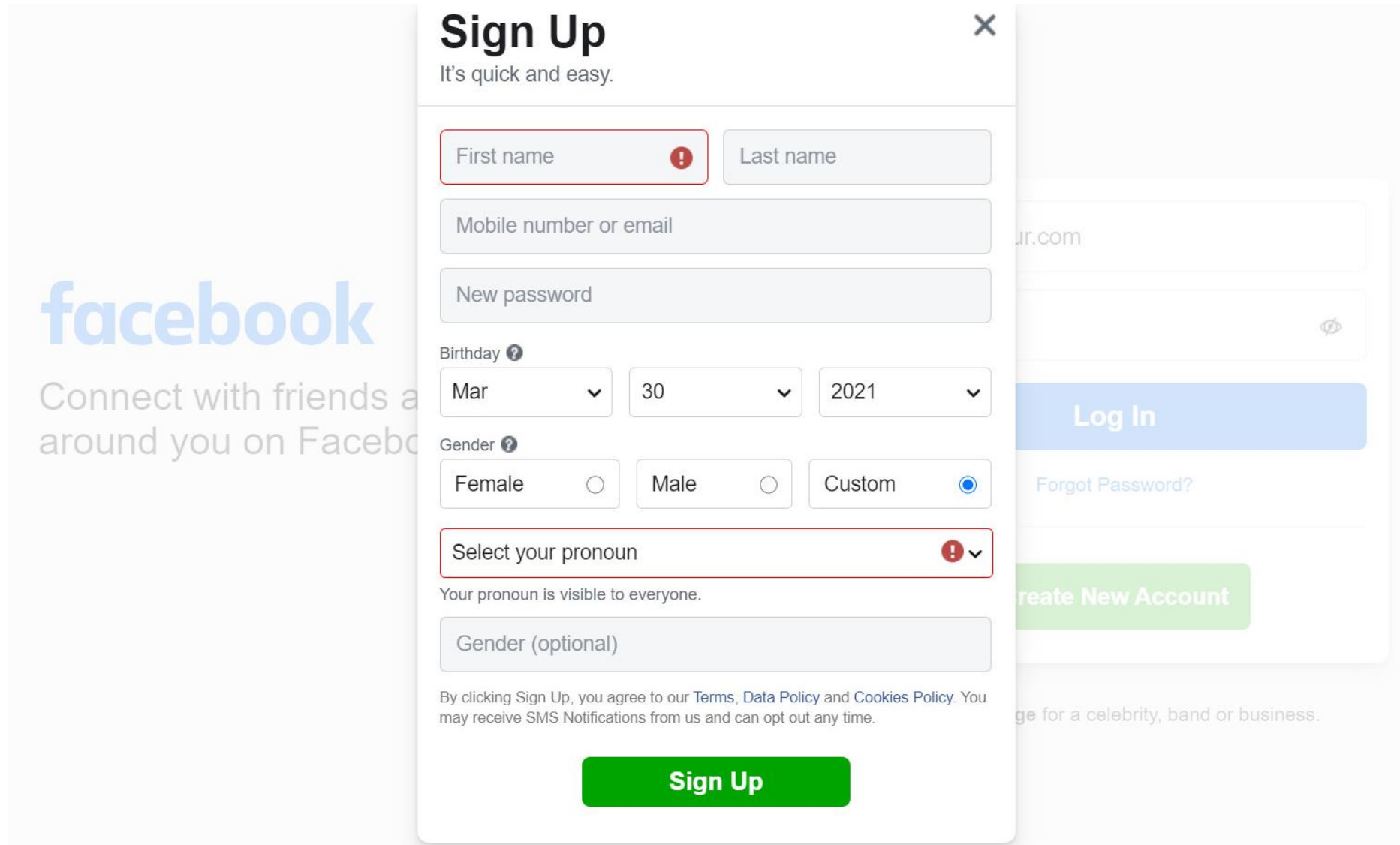
facebook
Connect with friends and groups you know around you on Facebook

Log In
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Sign up for a celebrity, band or business.

Facebook's current registration interface



The image shows a Facebook 'Sign Up' modal window. The modal has a title 'Sign Up' with a close button (X) in the top right corner. Below the title is the text 'It's quick and easy.' The form contains several input fields: 'First name' (with a red error icon), 'Last name', 'Mobile number or email', 'New password', 'Birthday' (with a help icon), 'Gender' (with a help icon), 'Select your pronoun' (with a red error icon and a dropdown arrow), and 'Gender (optional)'. The 'Birthday' field is a date picker with 'Mar', '30', and '2021' selected. The 'Gender' field has three radio buttons: 'Female', 'Male', and 'Custom' (which is selected). The 'Select your pronoun' field is currently empty. Below the 'Select your pronoun' field is the text 'Your pronoun is visible to everyone.' At the bottom of the modal is a green 'Sign Up' button. In the background, the Facebook logo and the text 'Connect with friends and groups you know around you on Facebook' are visible. To the right of the modal, a 'Log In' button and a 'Forgot Password?' link are visible. At the bottom right, there is a 'Create New Account' button and a link to 'Sign up for a celebrity, band or business.'

Sign Up X

It's quick and easy.

First name ! Last name

Mobile number or email

New password

Birthday ?

Mar 30 2021

Gender ?

Female Male Custom

Select your pronoun ! v

Your pronoun is visible to everyone.

Gender (optional)

By clicking Sign Up, you agree to our [Terms](#), [Data Policy](#) and [Cookies Policy](#). You may receive SMS Notifications from us and can opt out any time.

Sign Up

facebook

Connect with friends and groups you know around you on Facebook

Log In

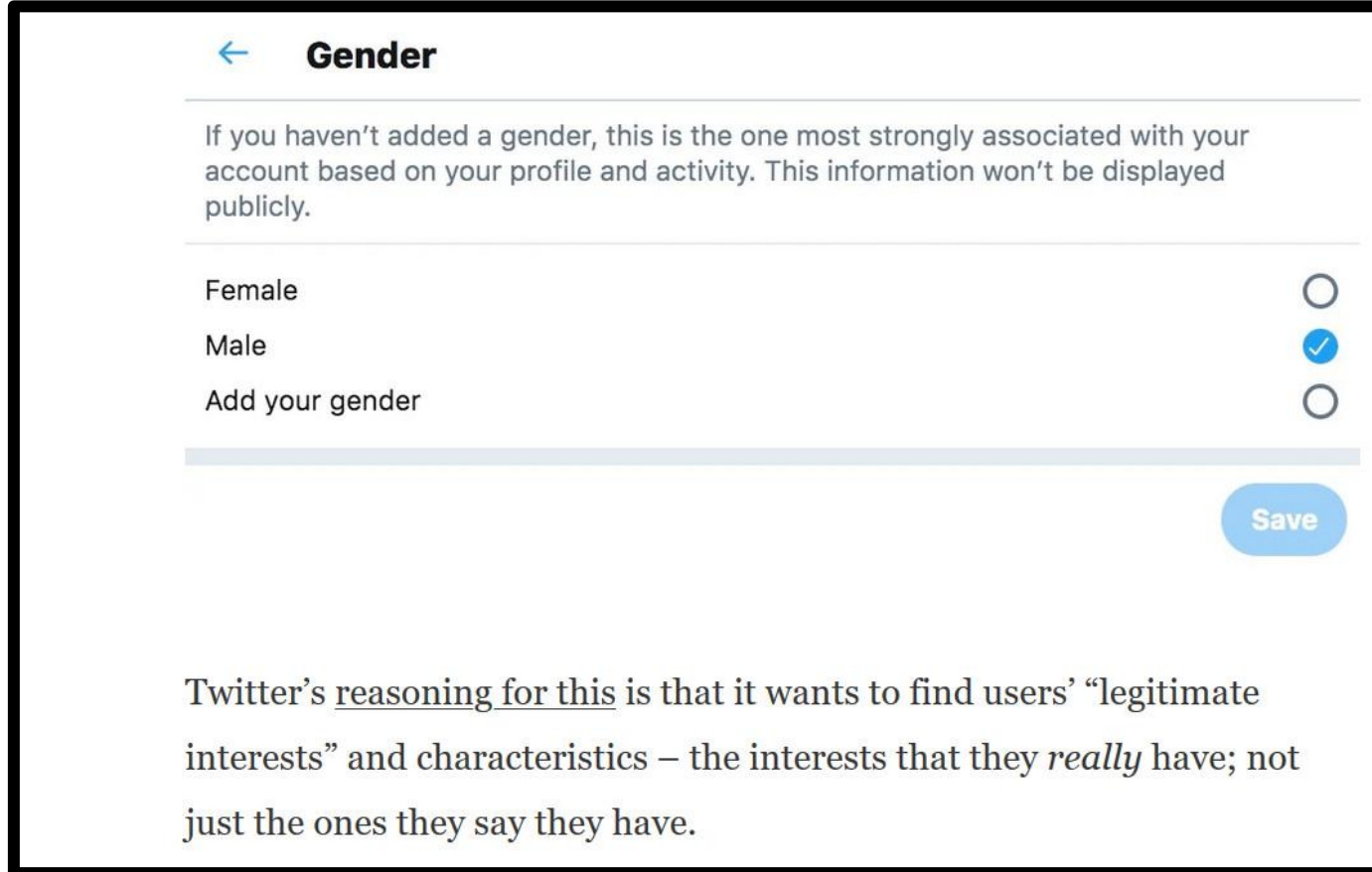
Forgot Password?

Create New Account

Sign up for a celebrity, band or business.

Inferring identity

- Twitter *guesses* your gender if you don't provide it
 - From: <https://reclaimthenet.org/twitter-assumes-gender-ads>



← Gender

If you haven't added a gender, this is the one most strongly associated with your account based on your profile and activity. This information won't be displayed publicly.

Female ☐

Male ☒

Add your gender ☐

Save

Twitter's reasoning for this is that it wants to find users' "legitimate interests" and characteristics – the interests that they *really* have; not just the ones they say they have.

**Who can access data in
an interface?**

Data access

- Slack: administrators *can* delete others' public messages
- Slack: administrators *cannot* access direct messages
- Zoom: administrators can request people unmute / turn on video
- Zoom: participants visible in meeting, but not in webcast
- Zoom: administrators can (retroactively) see participant times
- Unix OS: administrators can see everything

Stopping abuse

Anti-abuse

- Who chooses to block people?
 - On many sites, users can block others
 - Slack doesn't let a user block another

Retrospective editing

- Can you change what you've said in a platform after the fact?
 - Is there a marker? How do we balance accountability and privacy?

Retrospective editing

- Can you change what you've said in a platform after the fact?
 - Is there a marker? How do we balance accountability and privacy?

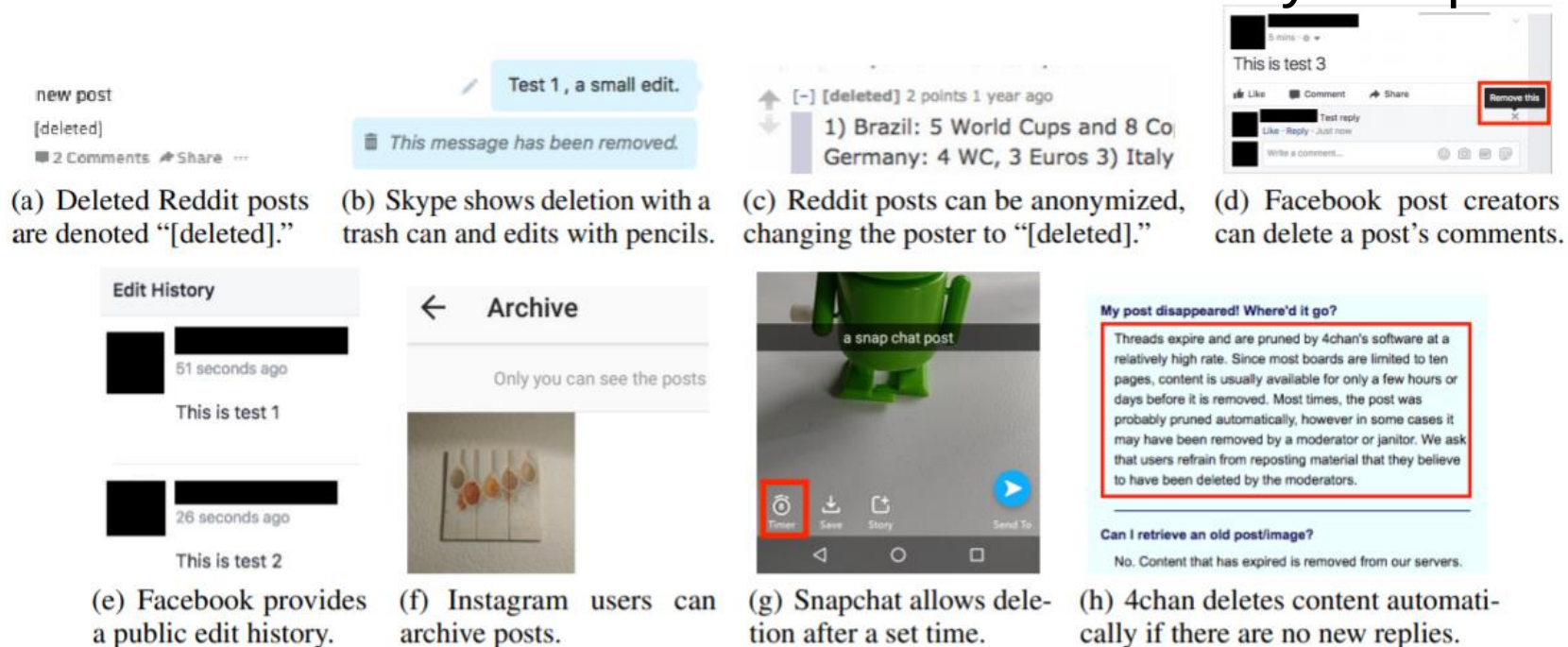


Figure 1: Example retrospective mechanisms and their associated markers as currently deployed on popular platforms.

Image taken from: Günce Su Yilmaz, Fiona Gasaway, Blase Ur, Mainack Mondal. Perceptions of Retrospective Edits, Changes, and Deletion on Social Media. In *Proc. ICWSM*, 2021

***What are your goals?
What are your
responsibilities?
(Business vs. user goals)***

Accessibility

Crucial considerations

- Cognitive impairments
 - Illiteracy
 - Memory difficulties
- Visual impairments
 - Sightedness
 - Color-blindness
- Dexterity impairments
- Hearing impairments

The importance of “alt” text

- ``
- This is what screen readers use!

The importance of video captions

Add your own subtitles & closed captions

Subtitles and closed captions open up your content to a larger audience, including deaf or hard of hearing viewers or those who speak languages besides the one spoken in your video. If you already have captions or subtitles, get help [editing or removing existing captions](#).

1. Go to your [Video Manager](#)  by clicking your account in the top right > **Creator Studio** > **Video Manager** > **Videos**.
2. Next to the video you want to add captions or subtitles to, click the drop-down menu next to the **Edit** button.
3. Select **Subtitles/CC**.
4. Click the **Add new subtitles or CC** button.
5. Choose how you want to add or edit subtitles or closed captions to your video:

[Create subtitles or closed captions](#)



[Upload a file](#)



[Transcribe and auto-sync \(original video language only\)](#)



[Use automatic captioning](#)

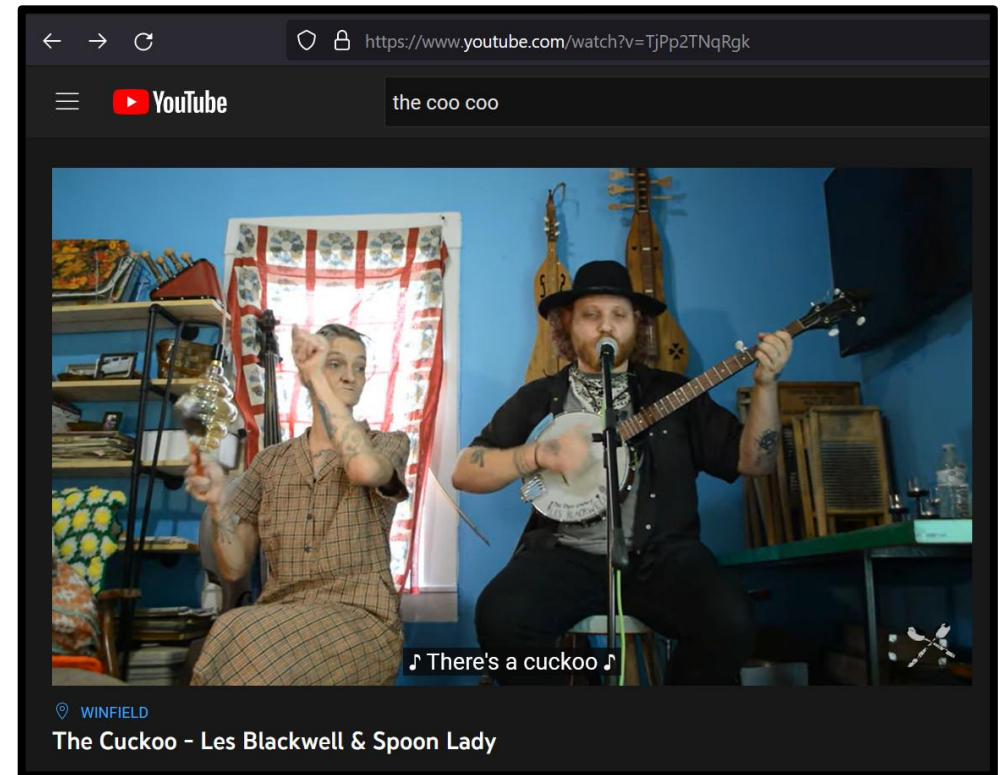
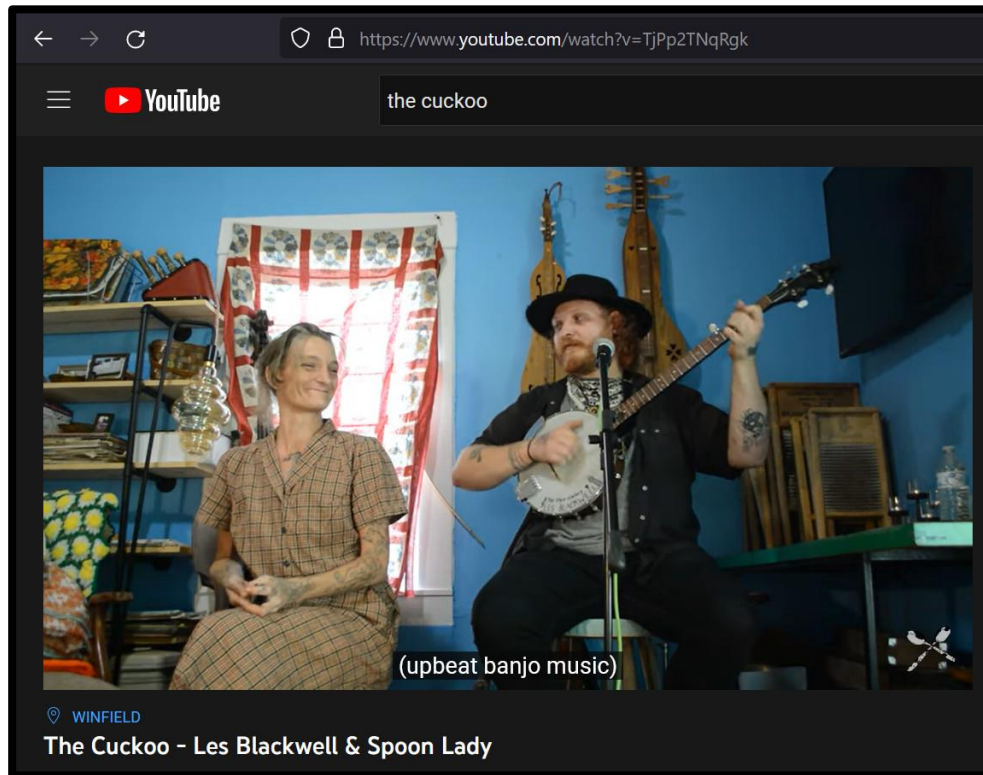


The importance of fonts and text

- Websites / apps should still work when magnified to a large size
- Don't use color to convey meaning
 - Screen readers do not interpret it
- High-contrast color combinations
- Don't include placeholders in form fields
- Make form fields easy to find

Subtitles

- Example from <https://www.youtube.com/watch?v=TjPp2TNqRgk>

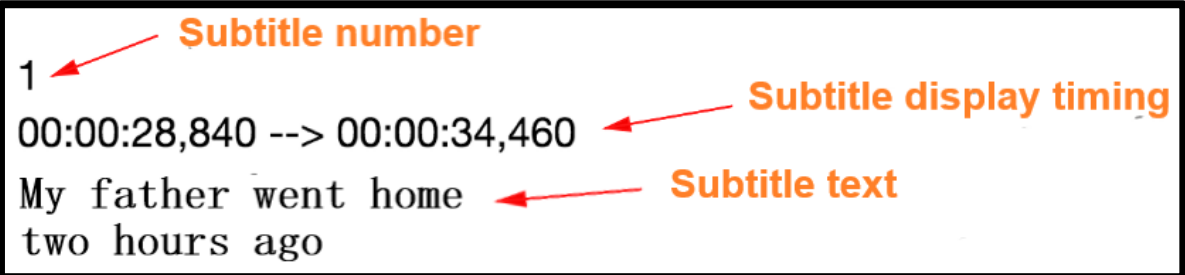


Subtitles

- Speech-to-text software can generate initial (imperfect) subtitles

- Example file formats:

- SRT (wide support)

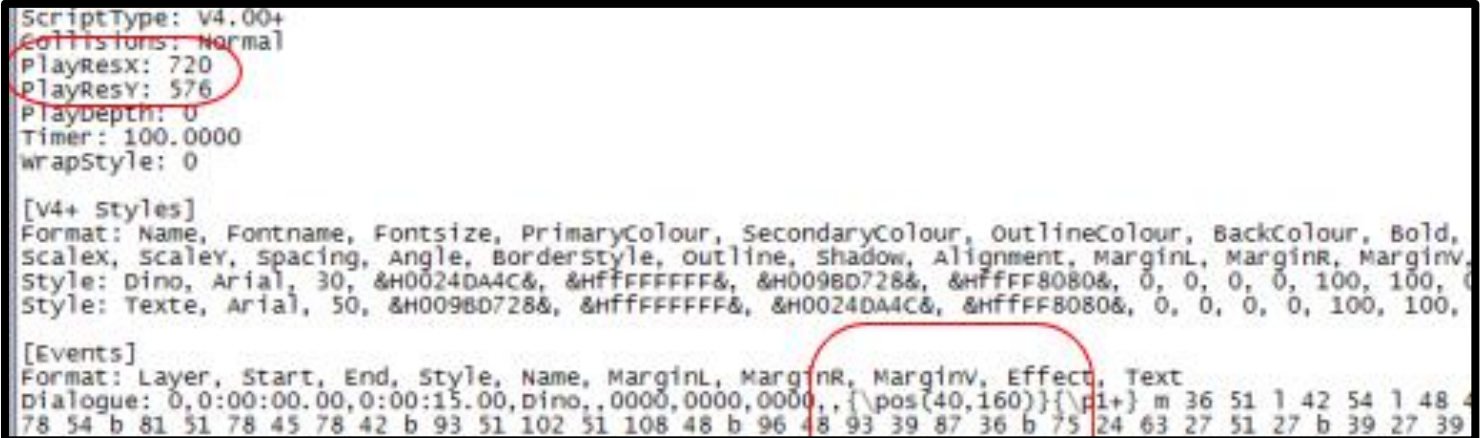


1
00:00:28,840 --> 00:00:34,460
My father went home
two hours ago

Annotations:

- Subtitle number (points to '1')
- Subtitle display timing (points to '00:00:28,840 --> 00:00:34,460')
- Subtitle text (points to 'My father went home two hours ago')

- SSA



```
ScriptType: V4.00+
Collisions: Normal
PlayResX: 720
PlayResY: 576
PlayDepth: 0
Timer: 100.0000
WrapStyle: 0

[V4+ Styles]
Format: Name, Fontname, Fontsize, PrimaryColour, SecondaryColour, OutlineColour, BackColour, Bold,
ScaleX, ScaleY, Spacing, Angle, BorderStyle, outline, shadow, Alignment, MarginL, MarginR, MarginV,
Style: Dino, Arial, 30, &H0024DA4C&, &HFFFFFFF&, &H009BD728&, &HFFF8080&, 0, 0, 0, 0, 100, 100, 0
Style: Texte, Arial, 50, &H009BD728&, &HFFFFFFF&, &H0024DA4C&, &HFFF8080&, 0, 0, 0, 0, 100, 100, 0

[Events]
Format: Layer, Start, End, Style, Name, MarginL, MarginR, MarginV, Effect, Text
Dialogue: 0,0:00:00.00,0:00:15.00,Dino,,0000,0000,0000,,{\pos(40,160)}{\p1+} m 36 51 1 42 54 1 48 4
78 54 b 81 51 78 45 78 42 b 93 51 102 51 108 48 b 96 48 93 39 87 36 b 75 24 63 27 51 27 b 39 27 39
```

Annotations:

- Collisions: Normal (circled in red)
- PlayResX: 720 (circled in red)
- PlayResY: 576 (circled in red)
- Style: Dino, Arial, 30, &H0024DA4C&, &HFFFFFFF&, &H009BD728&, &HFFF8080&, 0, 0, 0, 0, 100, 100, 0 (circled in red)
- Style: Texte, Arial, 50, &H009BD728&, &HFFFFFFF&, &H0024DA4C&, &HFFF8080&, 0, 0, 0, 0, 100, 100, 0 (circled in red)

Readability

- Standard metrics for the grade level of text
 - https://en.wikipedia.org/wiki/Readability#Popular_readability_formulas
 - https://www.online-utility.org/english/readability_test_and_improve.jsp

Conducting accessibility studies

- Follow accessibility guidelines
 - <https://developer.gnome.org/accessibility-devel-guide/stable/gad-ui-guidelines.html.en>
- Don't forget to user test with **diverse** populations that accurately reflect **all** users
 - <https://www.youtube.com/watch?v=t4DT3tQqgRM>

Internationalization

Translating privacy

For mobile apps without the inline audience selector (such as Facebook for Blackberry), the audience for things you post is:



Cum Intrați în legătură cu alții

Control how you connect with people you know.

[Schimbați setările](#)



Timeline and Tagging

Control what happens when friends tag you or your content, or post on your timeline.

[Schimbați setările](#)



Reclame, Aplicații și Website-uri

Gestionează-ți setările pentru reclame, aplicații, jocuri și sauturi.

[Schimbați setările](#)



Limitează audiența pentru postările anterioare

Limit the audience for posts you shared with friends of friends or Public.

[Administrează vizibilitatea postărilor din trecut](#)



Persoane și aplicații blocate

Translating privacy



リンク Twitter社はツイートに含まれるリンクをユーザーサービスやクライアントを含む当社サービス全体で、追跡してよいものとしします。これは広告を含めたリンクが何回クリックされたかなどの統計情報を共有可

Cookies: Like many websites, we use "cookie" technology to improve our Services, but we do not require cookies for navigating or looking at public user profiles or lists. A cookie is a small

Translating privacy

การทวิตสื่อ	☐ แสดงสื่อที่อาจจะมีเนื้อหาที่อ่อนไหว ☐ ทำสัญลักษณ์ไว้ว่าสื่อของฉันนั้นมีเนื้อหาที่อ่อนไหว หากคุณทวิตรูปภาพหรือวิดีโอที่อาจมีเนื้อหาอ่อนไหว โปรดเลือกช่องตัวเลือกนี้เพื่อที่คนอื่นๆ จะได้รับคำเตือนก่อนรับชมสื่อของคุณ ศึกษาเพิ่มเติม
ความเป็นส่วนตัวของทวิต	☐ ป้องกันทวิตของฉัน If selected, only those you approve will receive your Tweets. Your future Tweets will not be available publicly. Tweets posted previously may still be publicly visible in some places. Learn more.
การทำให้เป็นส่วนบุคคล	☐ Tailor Twitter based on my recent website visits Preview suggestions tailored for you (not currently available to all users). Learn more about how this works and your additional privacy controls.
HTTPS เท่านั้น	☐ ใช้ HTTPS เสมอ ใช้การเชื่อมต่อแบบปลอดภัยเมื่อมีให้ใช้งาน
รีเซ็ตรหัสผ่าน	☐ Require personal information to reset my password By default, you can initiate a password reset by entering only your @username. If you check this box, you will be prompted to enter your email address or phone number if you forget your password.

Translating privacy

إعدادات الخصوصية

تحكم بالخصوصية أثناء النشر

يمكنك التحكم بخصوصية تحديثات الحالات والصور والمعلومات باستخدام محدد الجمهور المضمن، وذلك عندما تقوم بالمشاركة أو بعد ذلك. تذكر: يستطيع دائما الأشخاص الذين تشارك معهم مشاركة معلوماتك مع الآخرين، بما في ذلك التطبيقات. حاول تعديل معلوماتك الأساسية لمعرفة كيفية عمل هذه الميزة أو اعرف المزيد.

ماذا يخطر في بالك؟

 San Francisco

نشر

عامة

For mobile apps without the inline audience selector (such as Facebook for Blackberry), the audience for things you post is:


مخصصة


الأصدقاء


العامة

تعديل الإعدادات

كيفية التواصل

تحكم بكيفية التواصل مع الأشخاص الذين تعرفهم.

Translating privacy

 Translation Center

Blog Forums

Need help? ▾ Blaze Cups ▾

Home / Twitter.com /

All phrases ▾

Untranslated Translated/Voted Live

privacy Search

will not be shown publicly. You can change your privacy settings at any time.

1 translations with 0 votes

Twitter does not disclose personally identifying information to third parties except in accordance with our Privacy Policy.

2 translations with 1 votes

`Preview suggestions tailored for you (not currently available to all users). Learn more about how this works and your additional privacy controls.`

1 translations with 0 votes

English phrase:

Twitter does not disclose personally identifying information to third parties except in accordance with our Privacy Policy.

2 Translations

+ Add translation

i More information

Live

Vote ✓

A Twitter nem oszt meg személyes azonosításhoz használható információkat harmadik féllel, kivéve az Adatvédelmi irányelveket a leírt eseteket.

0 votes
✓ Translation live

Posted by  [kkemenczy](#) on July 08, 2012

Vote ✓

A Twitter nem oszt meg személyes azonosításhoz használható információkat harmadik féllel, kivéve az Adatkezelési Nyilatkozatban leírt eseteket.

1 votes

Posted by  [mazvazzeg](#) on November 02, 2011

Translating privacy

Search for people, places and things

Blase Ur Home

Learn about cookies and Facebook.

Link: learn about cookies

Szavazás

Fordítás

Tudj meg többet a sütiokról és a Facebookról.

✓ x

kapd be a faszt te kis buzi

✓ x

Tudj meg többet a sütiokról és a Facebook-ról.

✓ x

Tudj meg többet a cookiekról és a Facebookról.

✓ x

Tudj meg többet a facebookról és a "cookiekról"

✓ x

További 3... ▼

Search

Search translations

☒ Translation ☐ English

Your Progress

0 translations

0 votes

Representing Written Language

Representing Text: ASCII (7 bits)

ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	\$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[ENG OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

Extended ASCII (8 bits)

128	Ç	144	É	160	á	176	░	193	⊥	209	〒	225	ß	241	±
129	ü	145	æ	161	í	177	▒	194	⌞	210	π	226	Γ	242	≥
130	é	146	Æ	162	ó	178	▓	195	⌟	211	ℓ	227	π	243	≤
131	â	147	ô	163	û	179		196	—	212	ℓ	228	Σ	244	∫
132	ä	148	ö	164	ñ	180	⌞	197	⊕	213	ℙ	229	σ	245	∫
133	à	149	ò	165	Ñ	181	⌞	198	⌞	214	π	230	μ	246	÷
134	â	150	û	166	ª	182	⌞	199	⌞	215	⌞	231	τ	247	≈
135	ç	151	ù	167	º	183	π	200	ℓ	216	⌞	232	Φ	248	°
136	ê	152	—	168	¿	184	⌞	201	ℙ	217	⌞	233	⊗	249	·
137	ë	153	Ö	169	—	185	⌞	202	ℓ	218	⌞	234	Ω	250	·
138	è	154	Ü	170	¬	186	⌞	203	〒	219	■	235	δ	251	√
139	ï	156	£	171	½	187	⌞	204	⌞	220	■	236	∞	252	—
140	î	157	¥	172	¼	188	⌞	205	=	221	■	237	φ	253	²
141	ï	158	—	173	¡	189	⌞	206	⌞	222	■	238	ε	254	■
142	Ä	159	ƒ	174	«	190	⌞	207	⌞	223	■	239	∩	255	
143	Å	192	ˆ	175	»	191	⌞	208	ℓ	224	α	240	≡		

Unicode

- Variable-width character encoding
 - <https://en.wikipedia.org/wiki/UTF-8>

Availability

Availability

- Are you assuming a technology that people don't have?
 - COVID-19 contact tracing
- Are we assuming constant internet connectivity?
 - Are we assuming anything other than periodic connectivity?
- Are we assuming a high-bandwidth connection?
 - Are we designing for low-bandwidth situations?
 - Does our system adapt to these low-bandwidth situations?
- Are we assuming constant access to electricity?

Mobile Money



Mobile Money



Legacy Systems

Legacy systems and legacy code

- A shocking amount of code written in languages like Fortran and COBOL is still in use!
- A shocking number of mainframe systems are still in use
- How do we deploy modern protections and modern performance enhancements to these systems?
 - For example, what if we want to roll out two-factor authentication?