



Desenvolvendo aplicativos acessíveis

Tornando seu app disponível para todos

A decorative wavy line in a light blue color starts from the left edge of the slide and curves downwards and to the right, ending near the bottom center.

Diego Malone

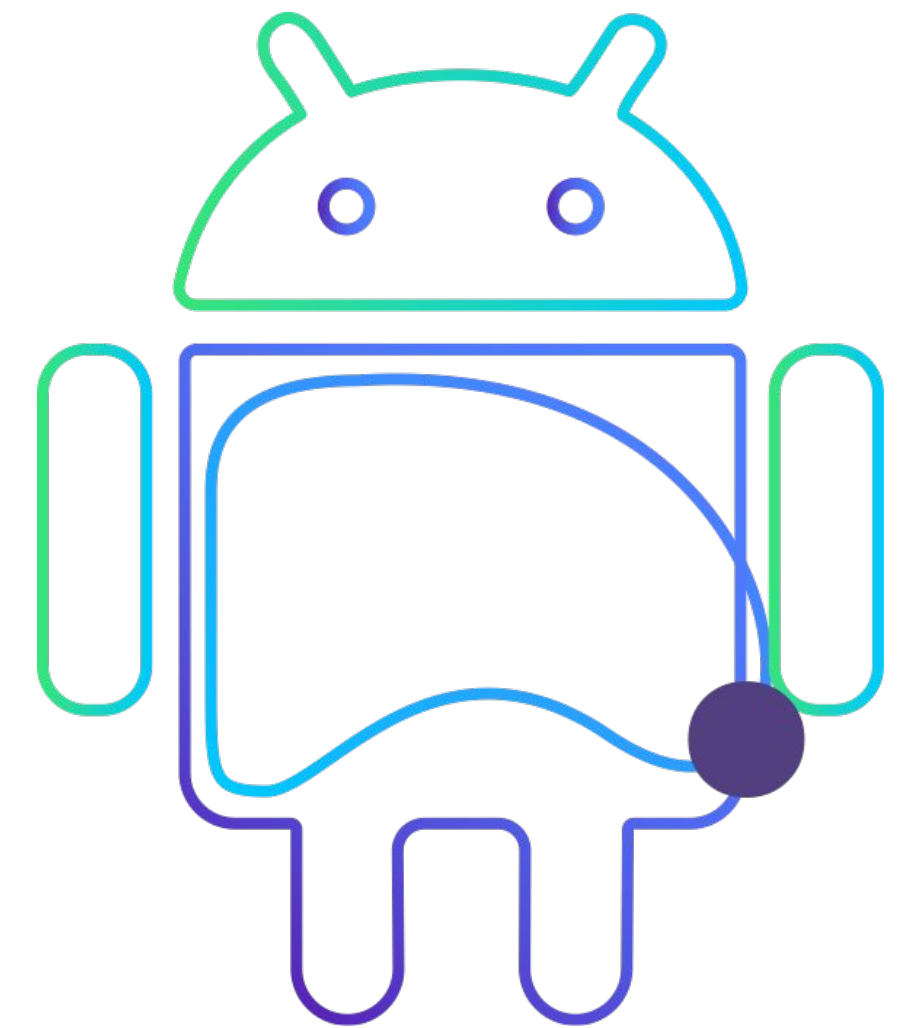
Sobre Mim

- Desenvolvedor Android na Concrete
- Carioca
- Passado escrito em PHP



Agenda

-
- O que é acessibilidade?
- Tecnologias assistivas
- Serviços de acessibilidade
- Framework de acessibilidade
- Boas práticas





O que é acessibilidade?



O que é acessibilidade?

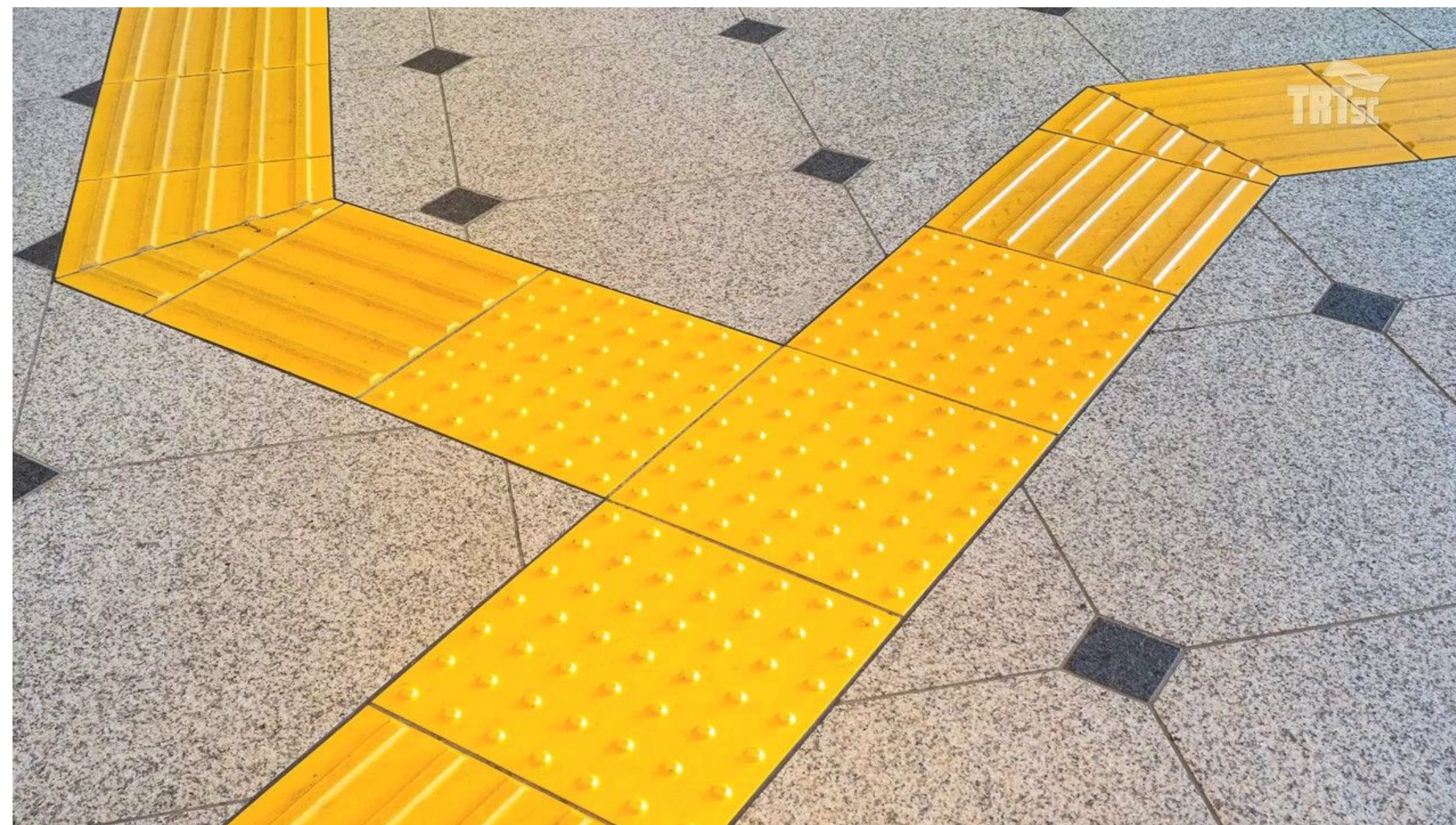
Consegue ler agora?

Acessibilidade

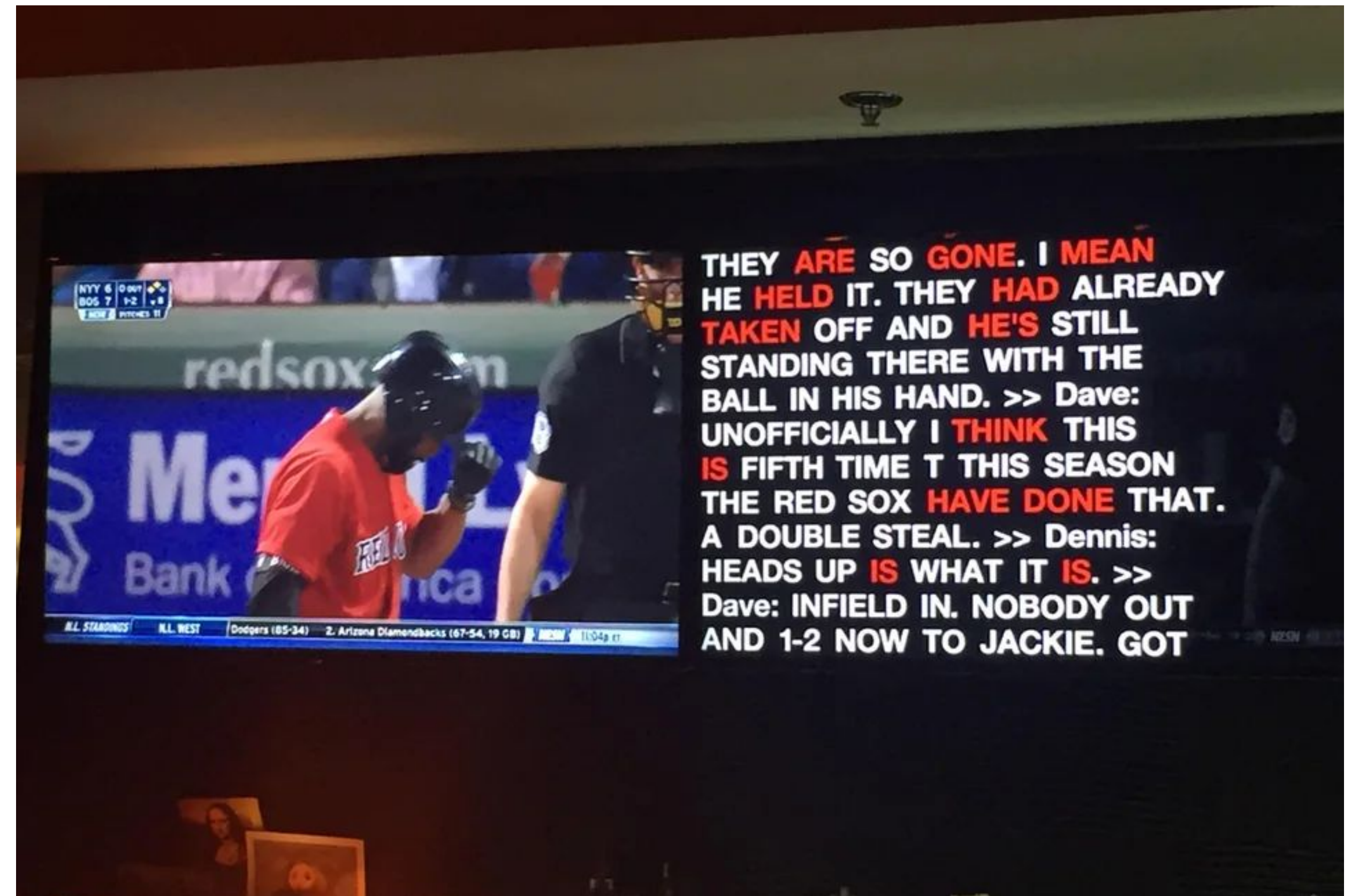
“possibilidade e condição de alcance para utilização, com segurança e autonomia, de espaços, mobiliários, [...] sistemas e tecnologias, [...] por pessoa com deficiência ou com mobilidade reduzida;”

Fonte: Lei 13.146/2015

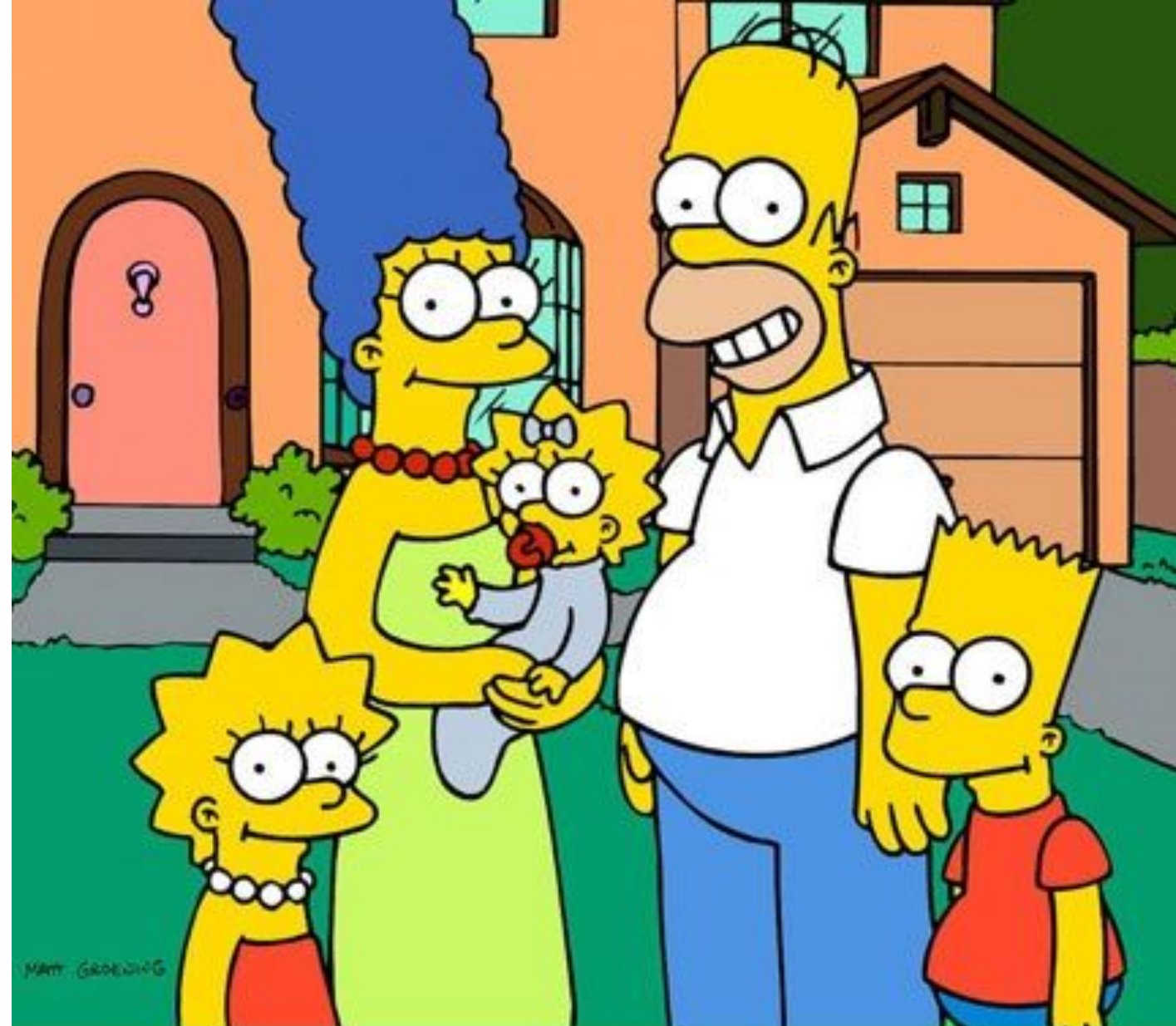
Na prática



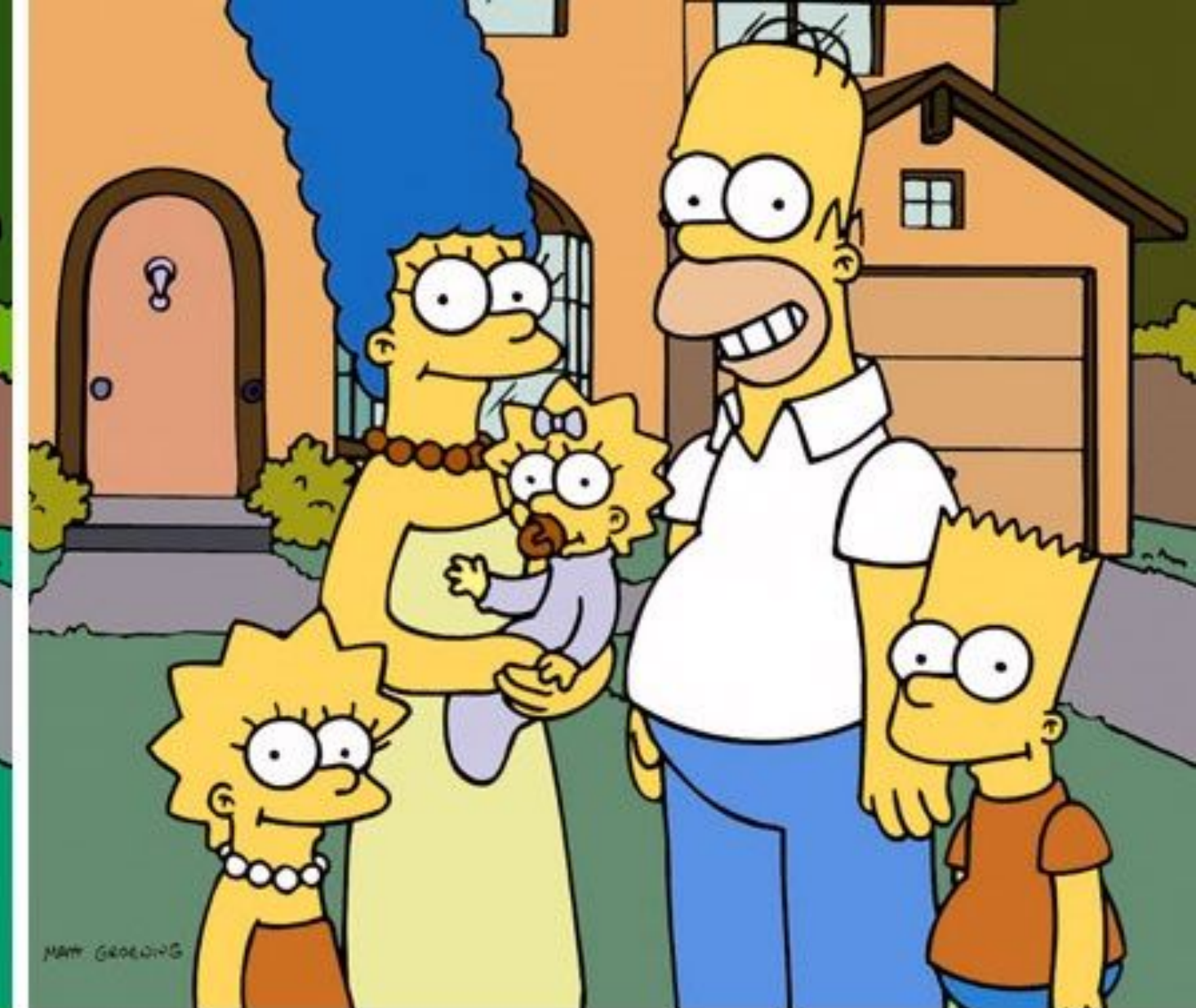
A acessibilidade traz benefícios para todos



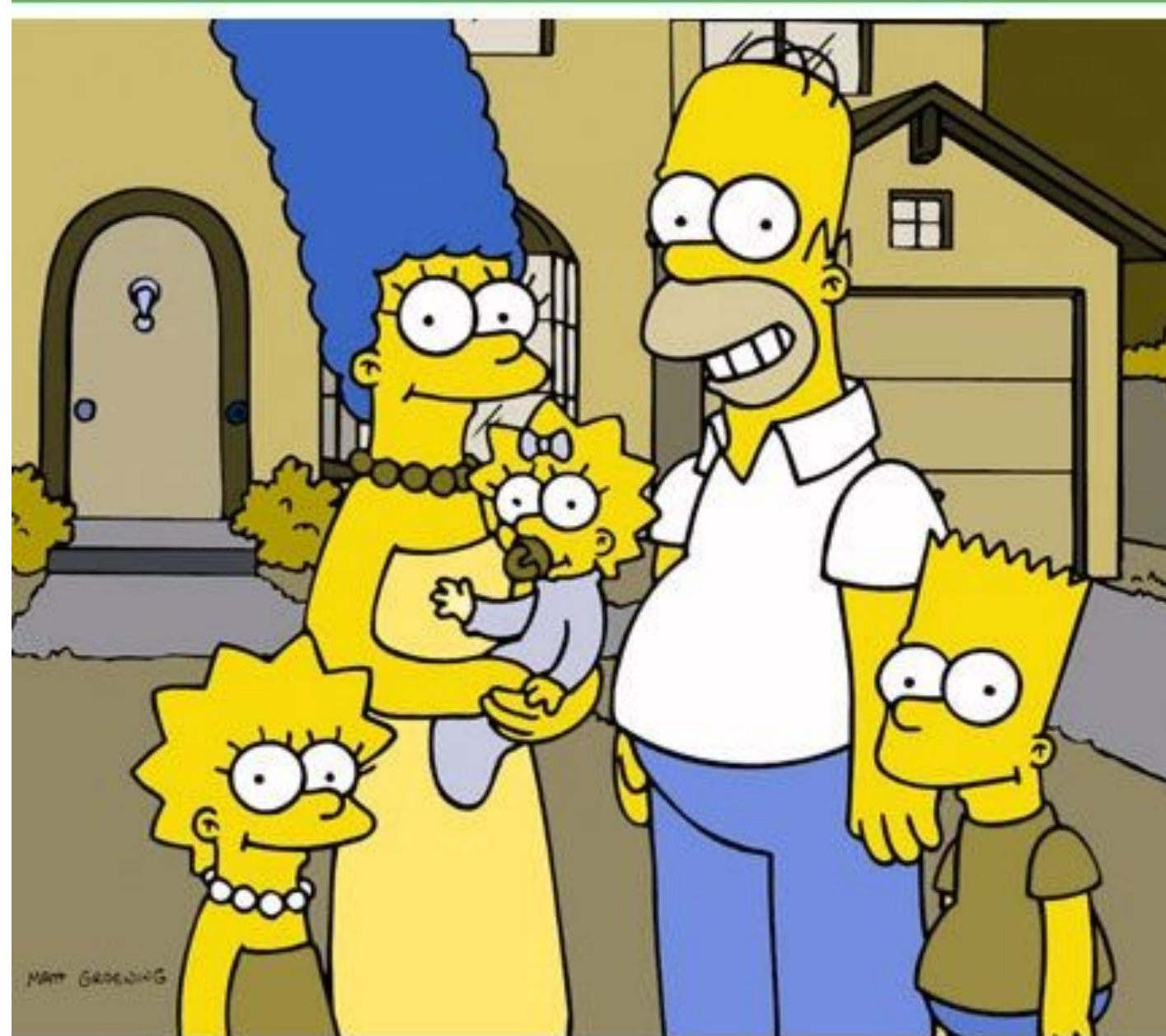
Daltonismo



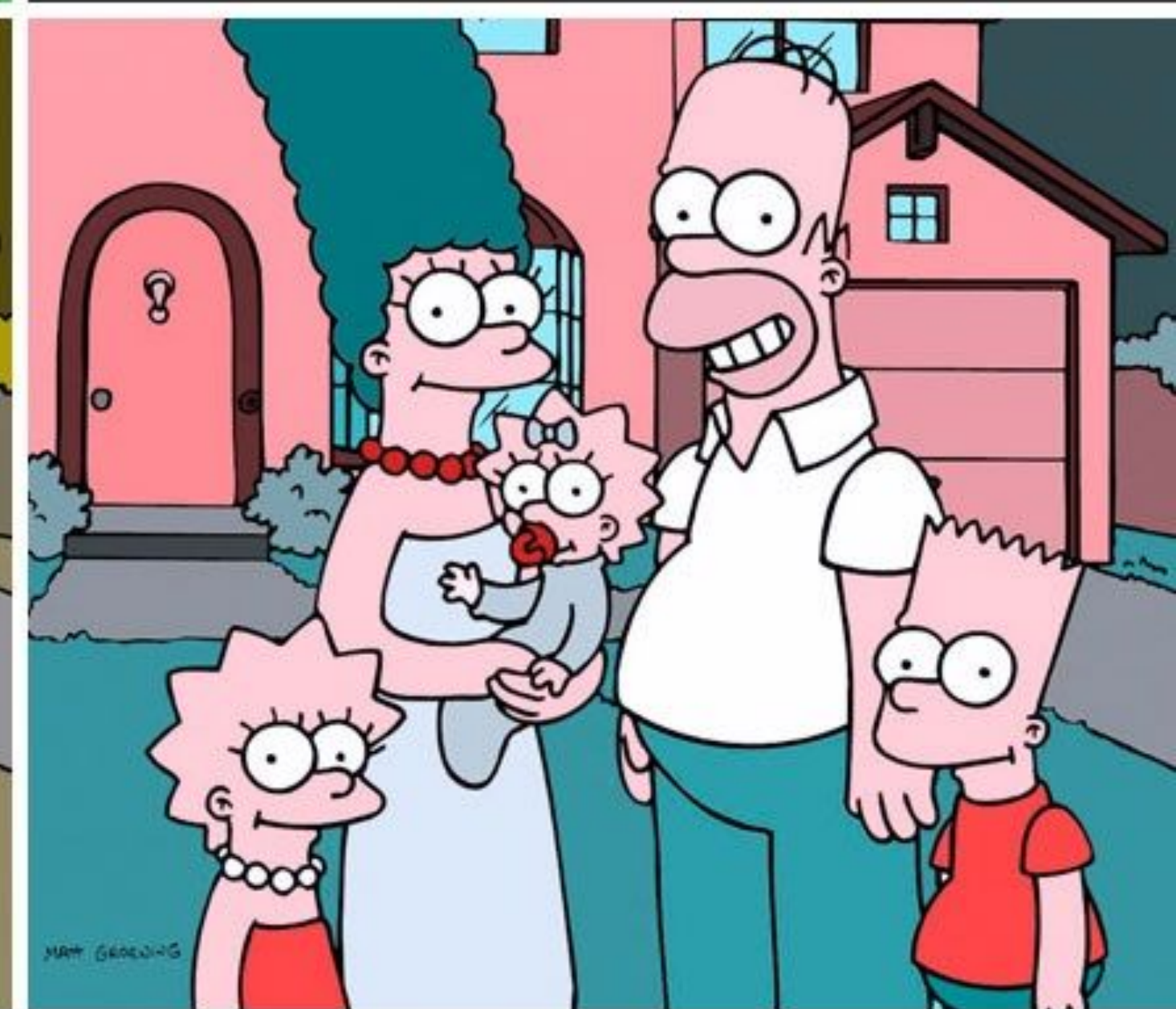
VISÃO NORMAL



DEUTERANOMALIA



PROTANOPIA



TRITANOPIA

Daltonismo



VISÃO NORMAL



DEUTERANOMALIA



PROTANOPIA



TRITANOPIA

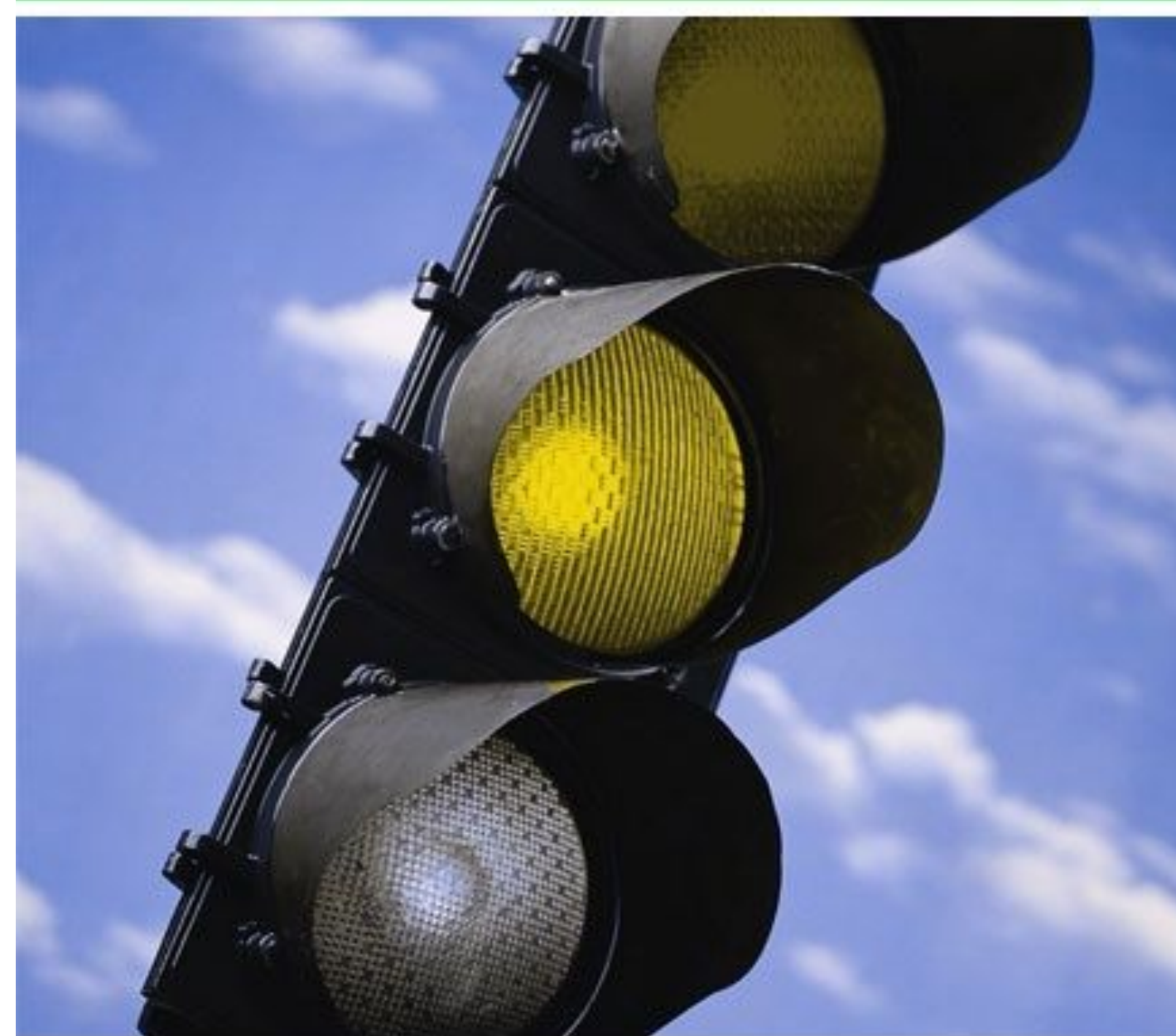
Daltonismo



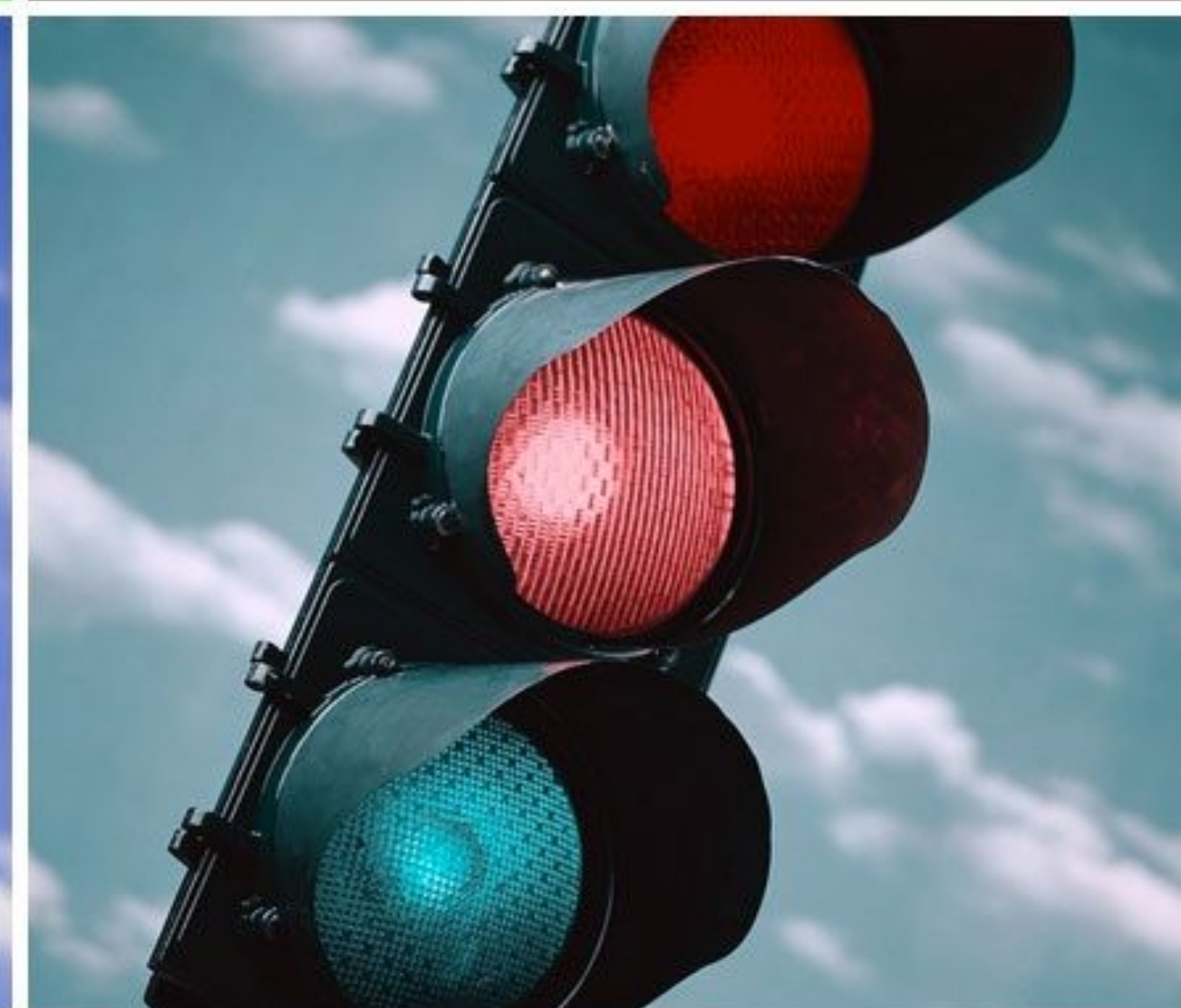
VISÃO NORMAL



DEUTERANOMALIA

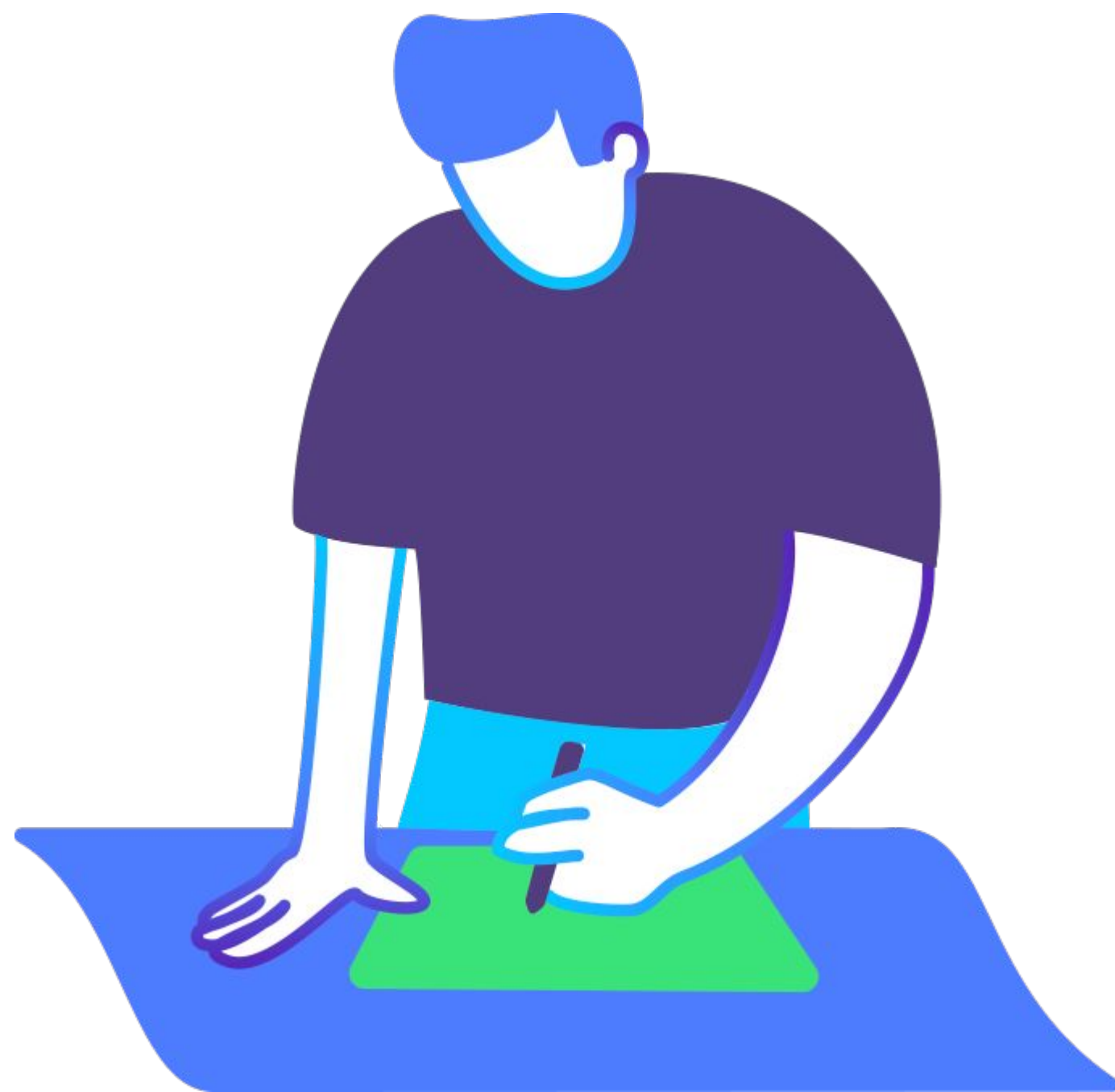


PROTANOPIA



TRITANOPIA

Canhotos















Canhotos



Tipos de deficiência

-
- Permanente, temporária ou situacional
 - Toque
 - Visão
 - Audição
 - Fala

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Hear	 Deaf	 Ear infection	 Bartender
Speak	 Non-verbal	 Laryngitis	 Heavy accent

Tipos de deficiência



Toque



Um braço



Braço
Imobilizado



Filho pequeno

See



Blind



Cataract



Distracted driver

Hear



Deaf



Ear infection



Bartender

Speak



Non-verbal



Laryngitis



Heavy accent

Tipos de deficiência



Visão






Cego









Catarata



Dirigindo

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent

Hear	 Deaf	 Ear infection	 Bartender
------	---	--	--

Speak	 Non-verbal	 Laryngitis	 Heavy accent
-------	---	---	---

Tipos de deficiência



Audição



Surda



Infecção de ouvido



Bartender

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Speak	 Non-verbal	 Laryngitis	 Heavy accent

Tipos de deficiência



Fala






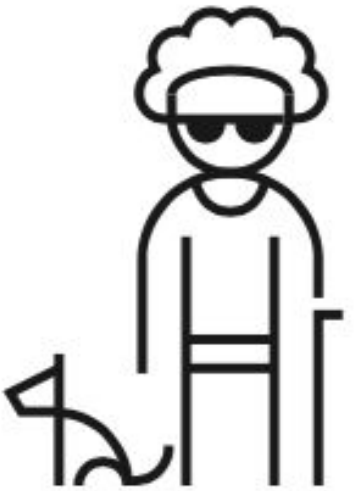




Mudo



Laringite



Sotaque

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Hear	 Deaf	 Ear infection	 Bartender

Pessoas com deficiência no Brasil

45,6 milhões de pessoas

23% da população brasileira

Fonte: Censo 2010



E o quanto consideramos essas pessoas no desenvolvimento dos nossos aplicativos?

“[...] A menos que você tome uma decisão geral de que as pessoas com deficiências não façam parte do seu público, realmente não pode dizer que seu site é usável a menos que seja acessível.”

Steve Krug

Fonte: Não me faça pensar, 2014

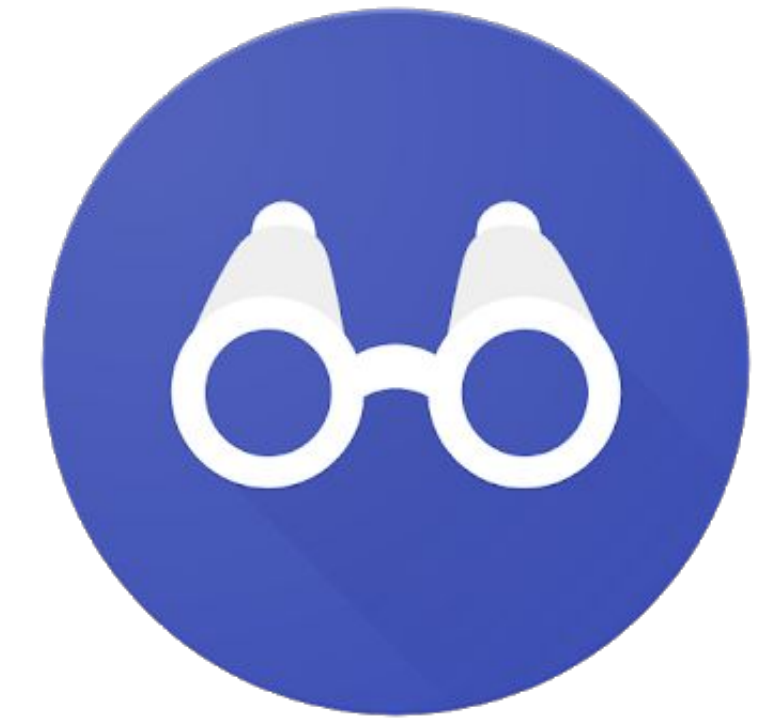
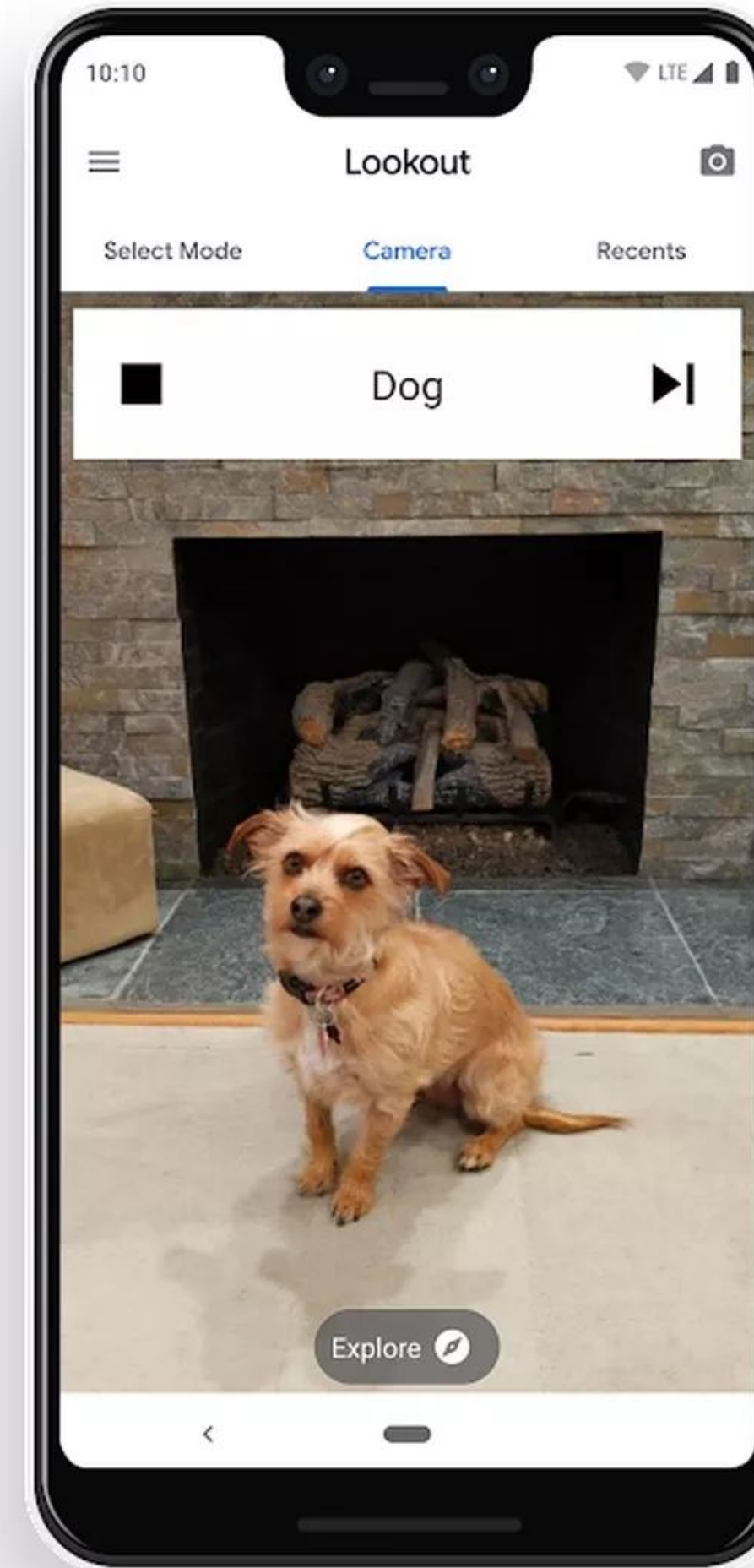
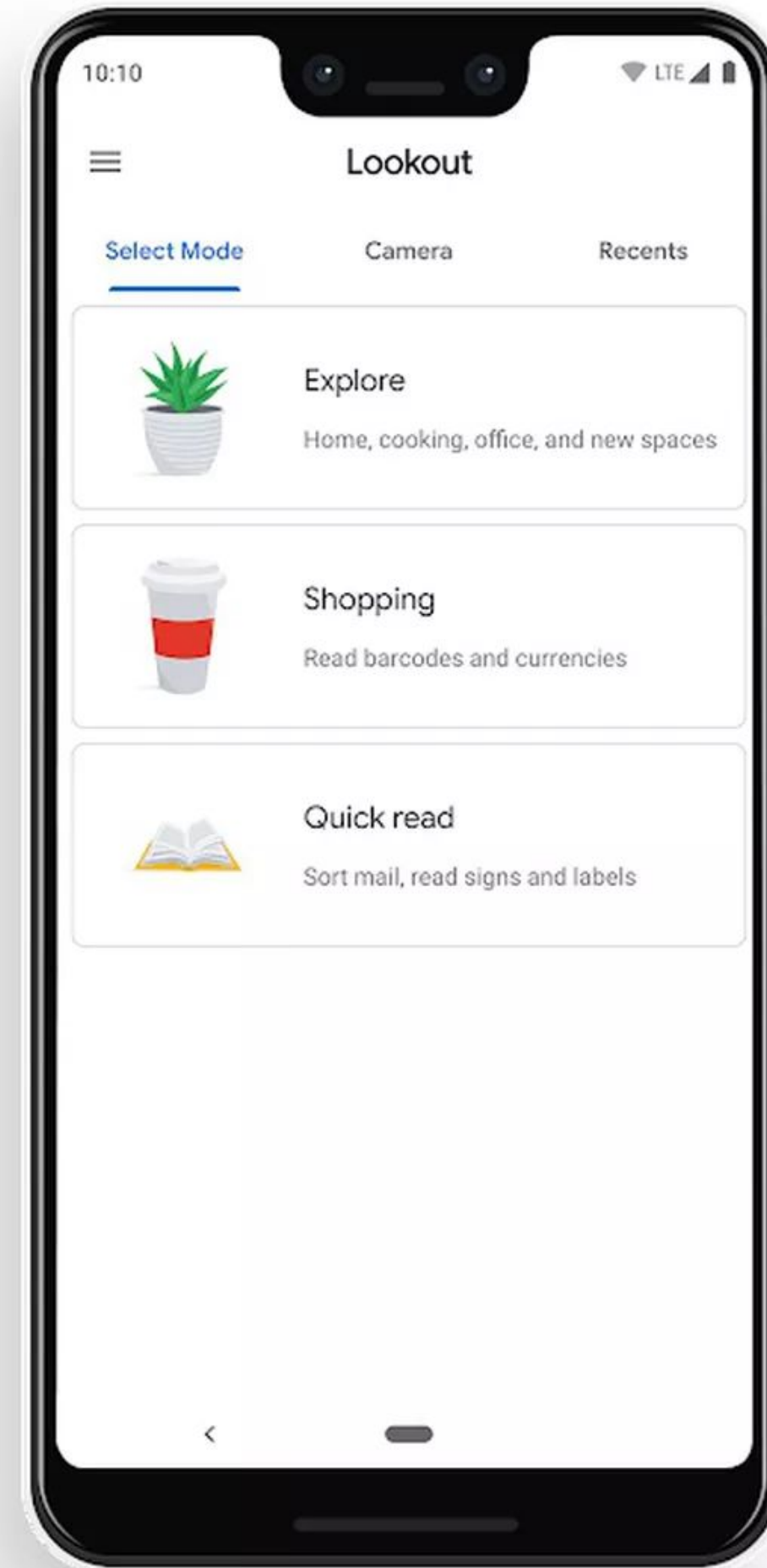
Usabilidade?





Tecnologias Assistivas

Lookout



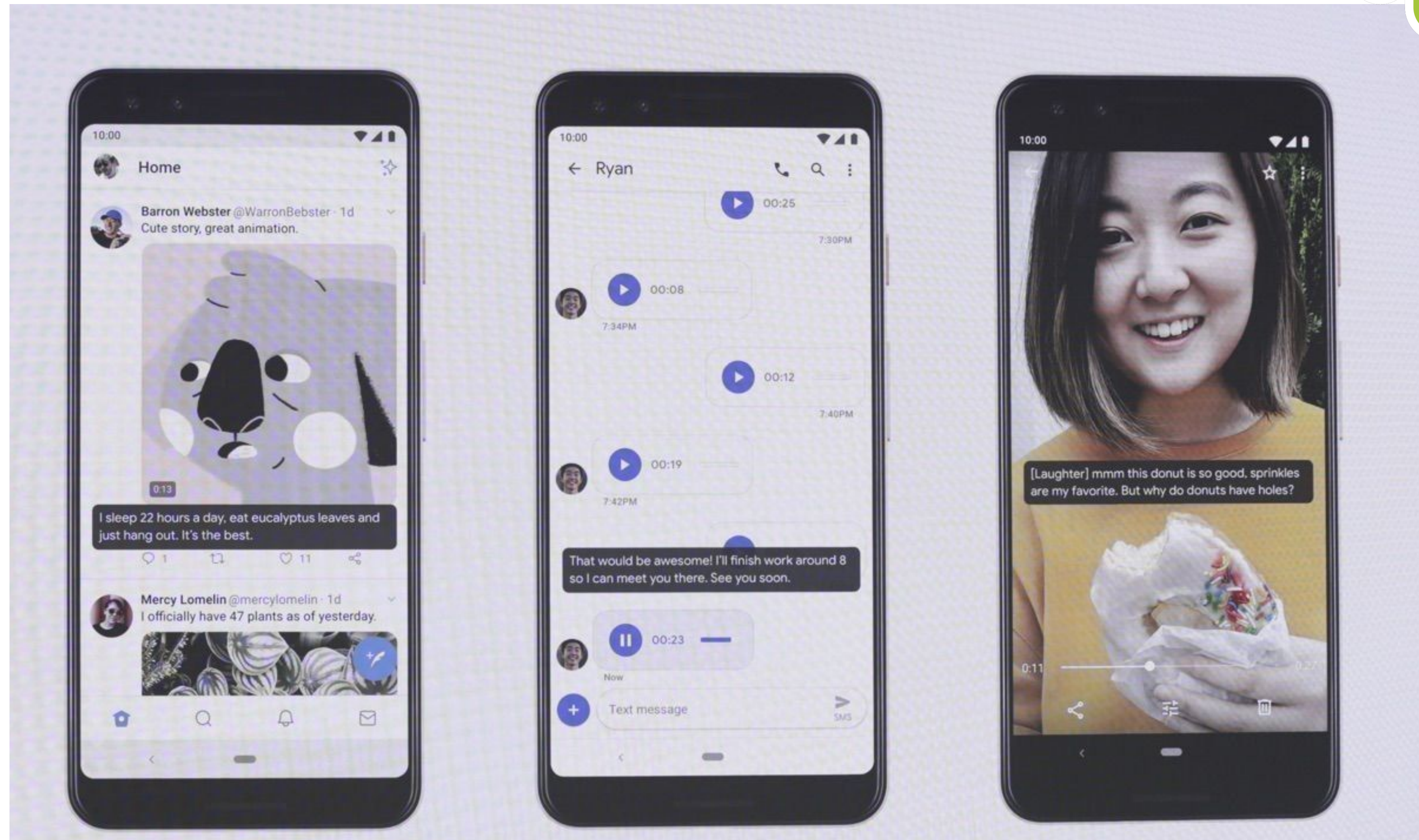
<https://www.youtube.com/watch?v=k1mz7b-A22c>

Chord Assist



<http://bit.ly/chord-assist>

Live Caption



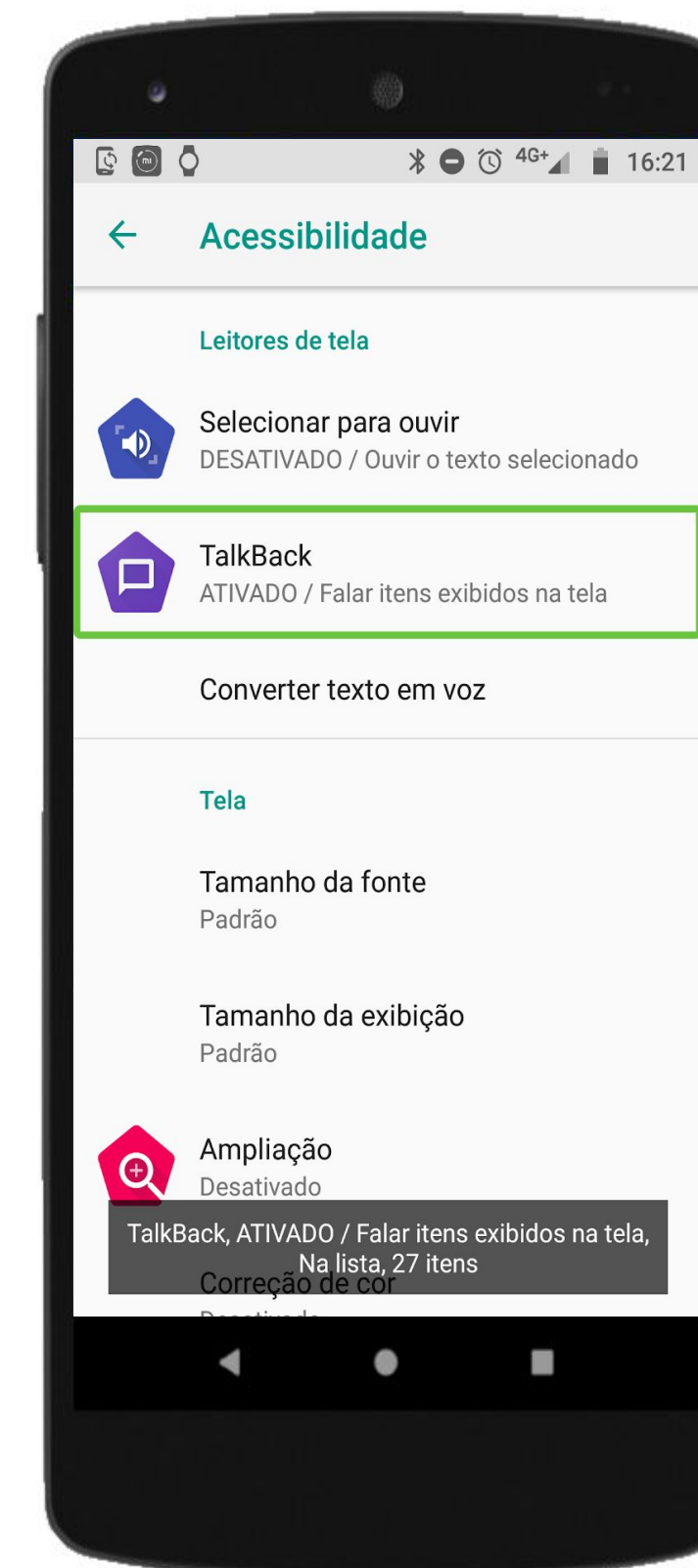
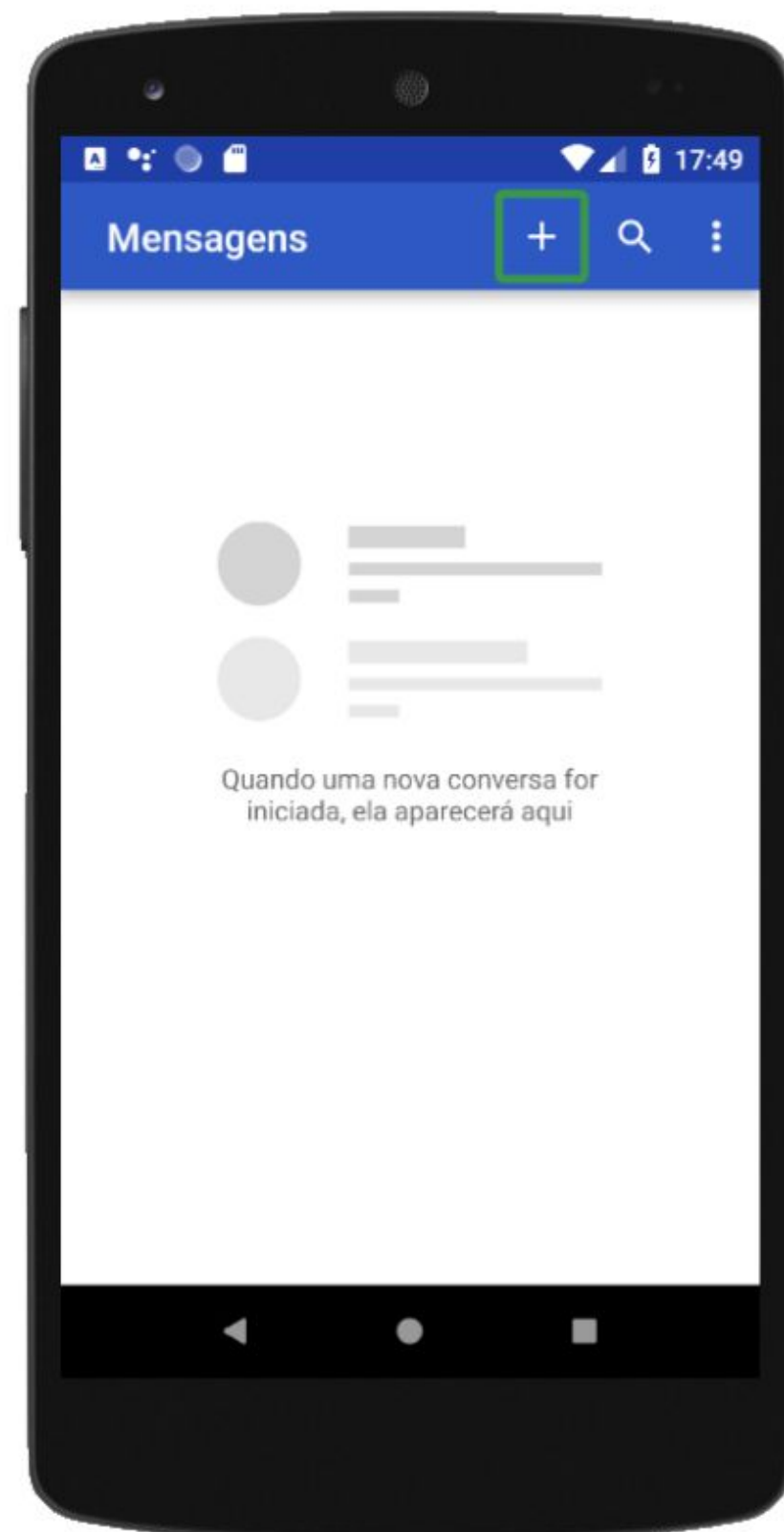
<https://www.youtube.com/watch?v=hPv1PkjJ-J0>



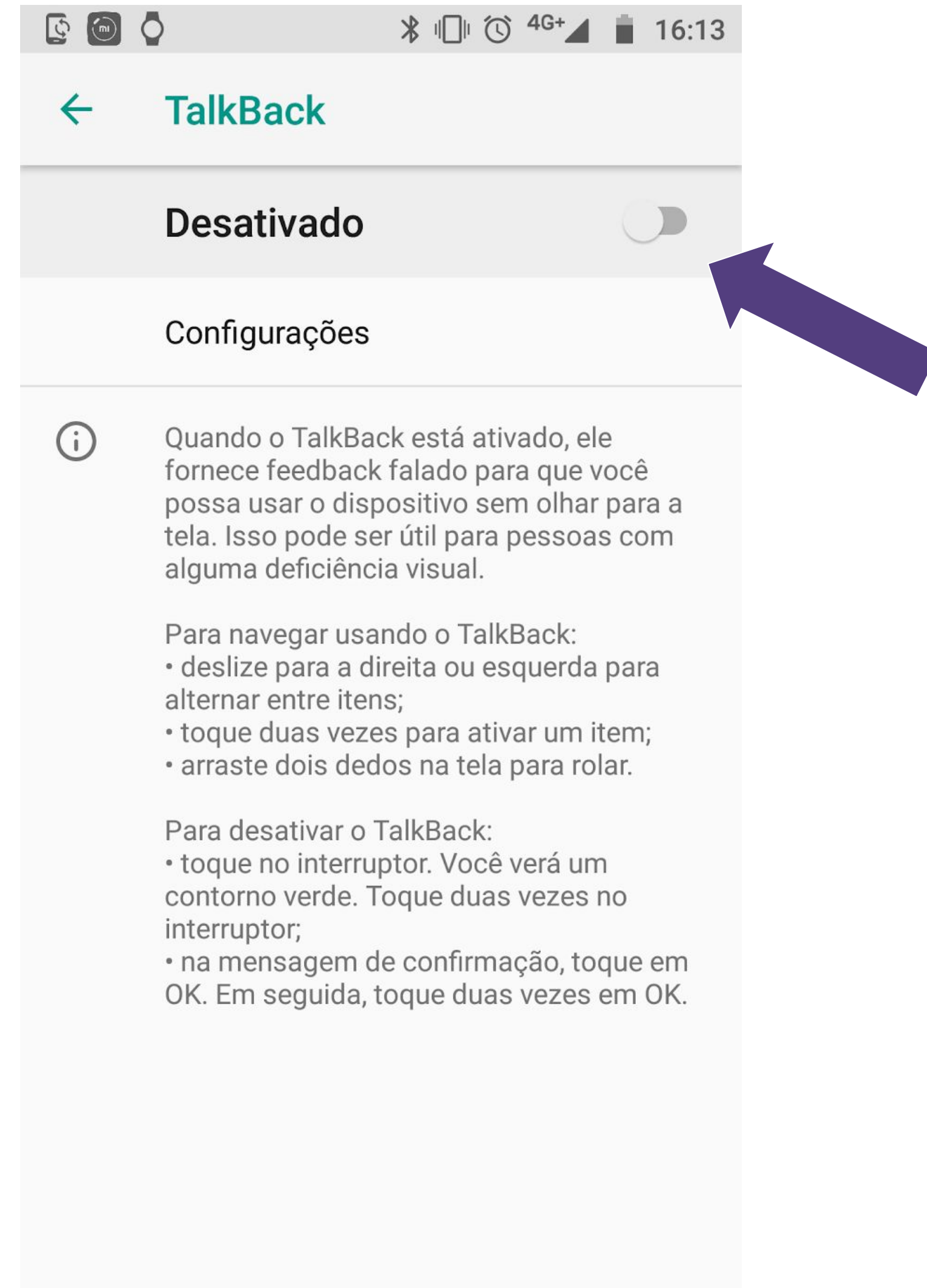
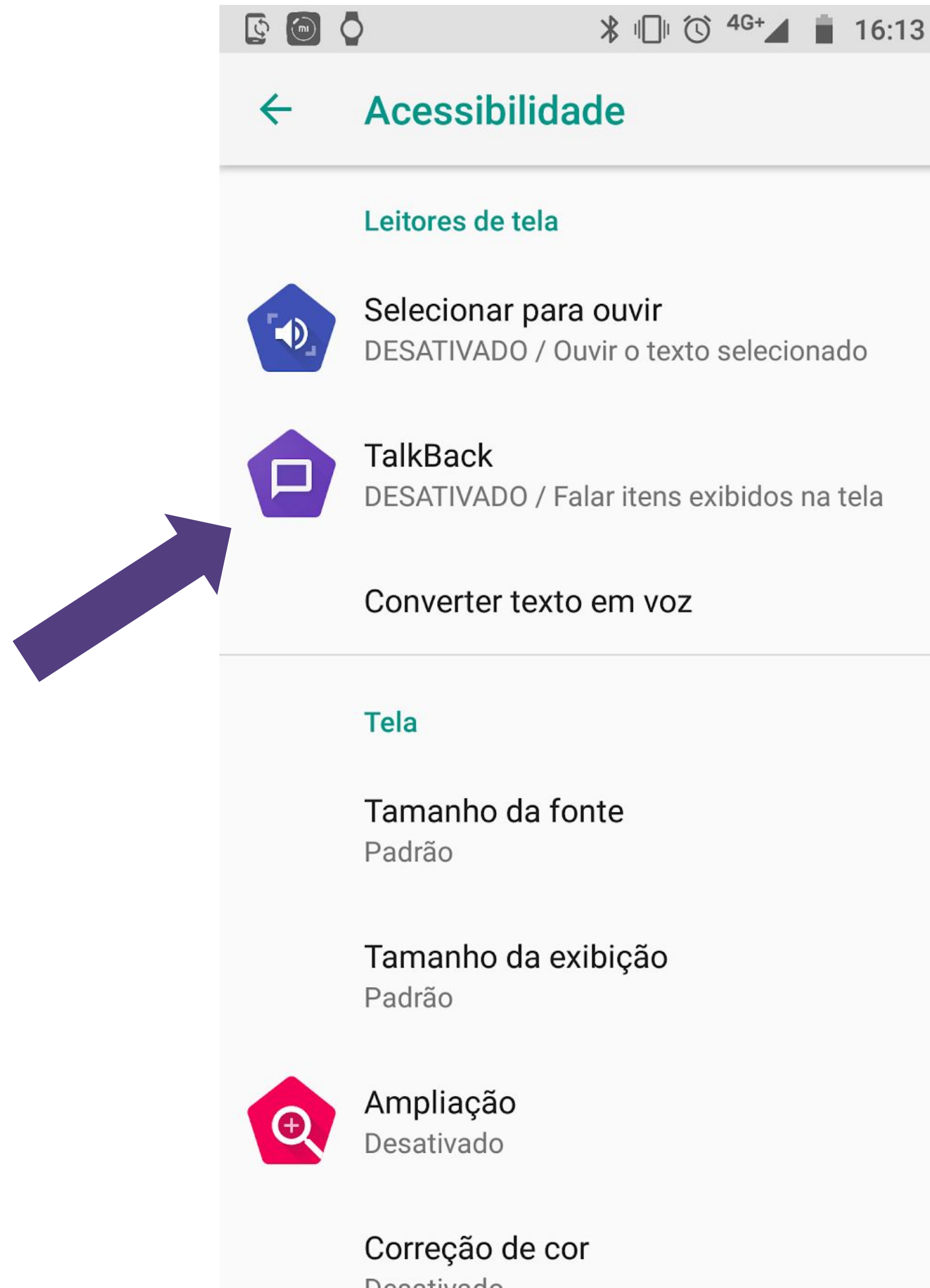
Serviços de Acessibilidade

Talkback

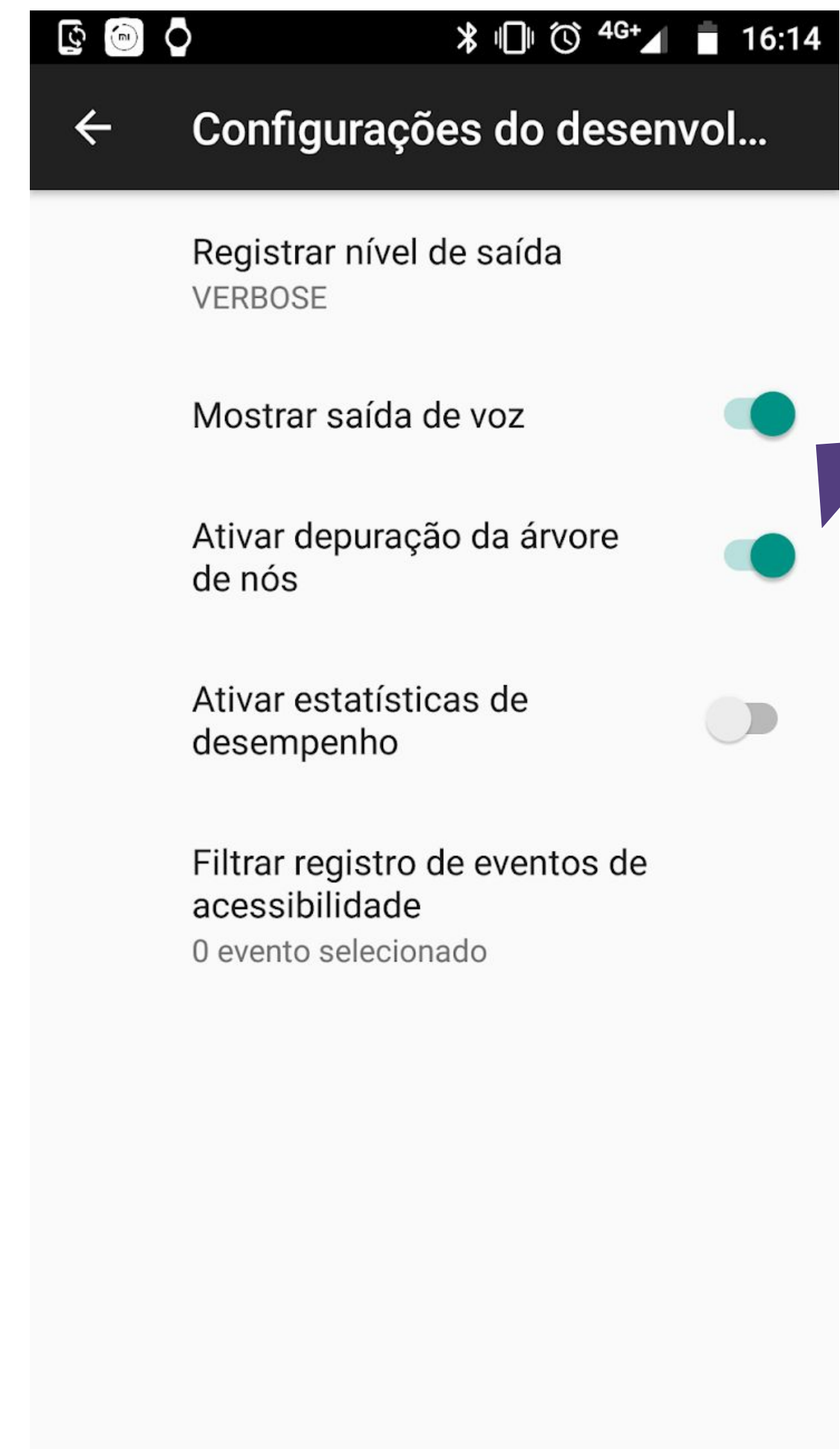
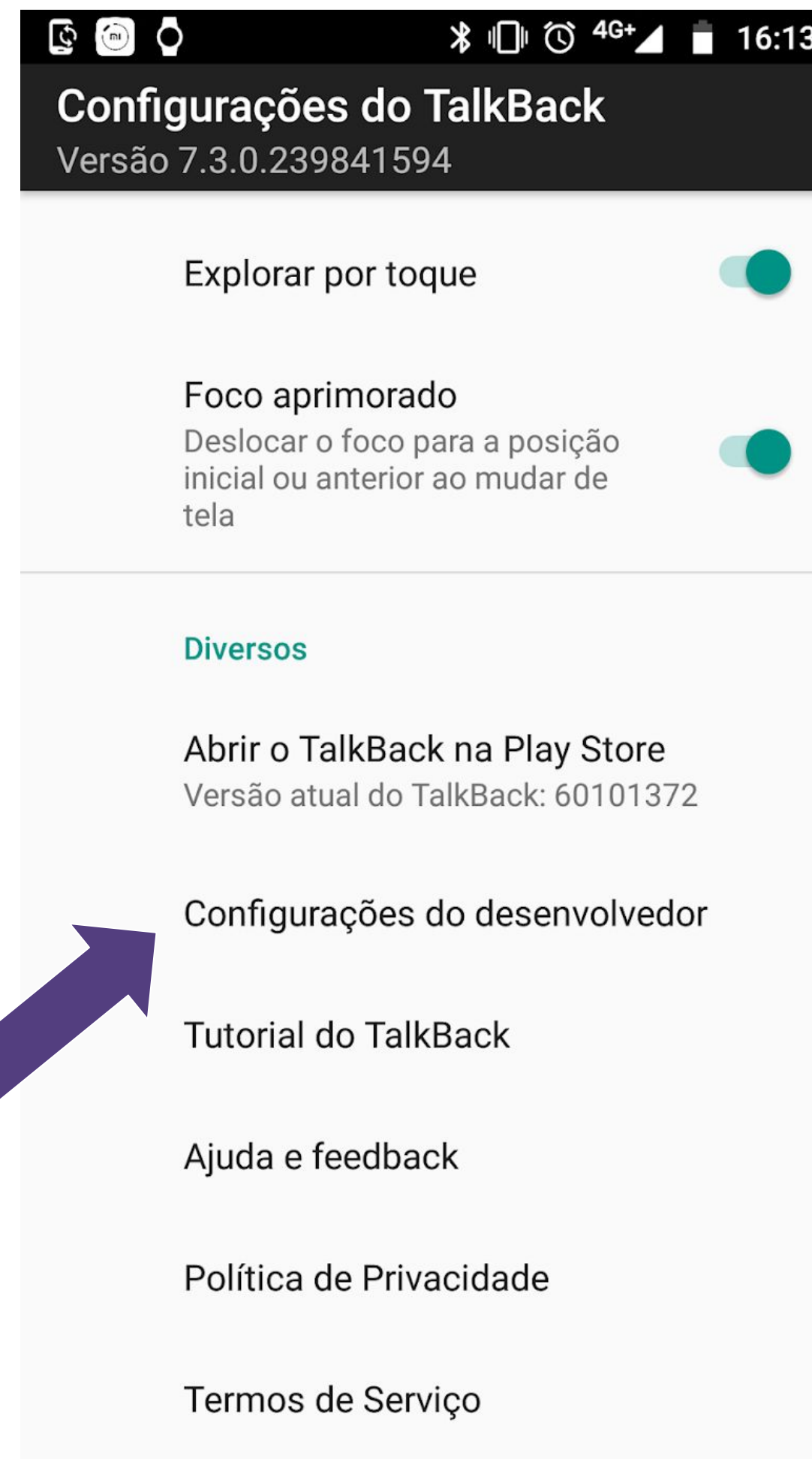
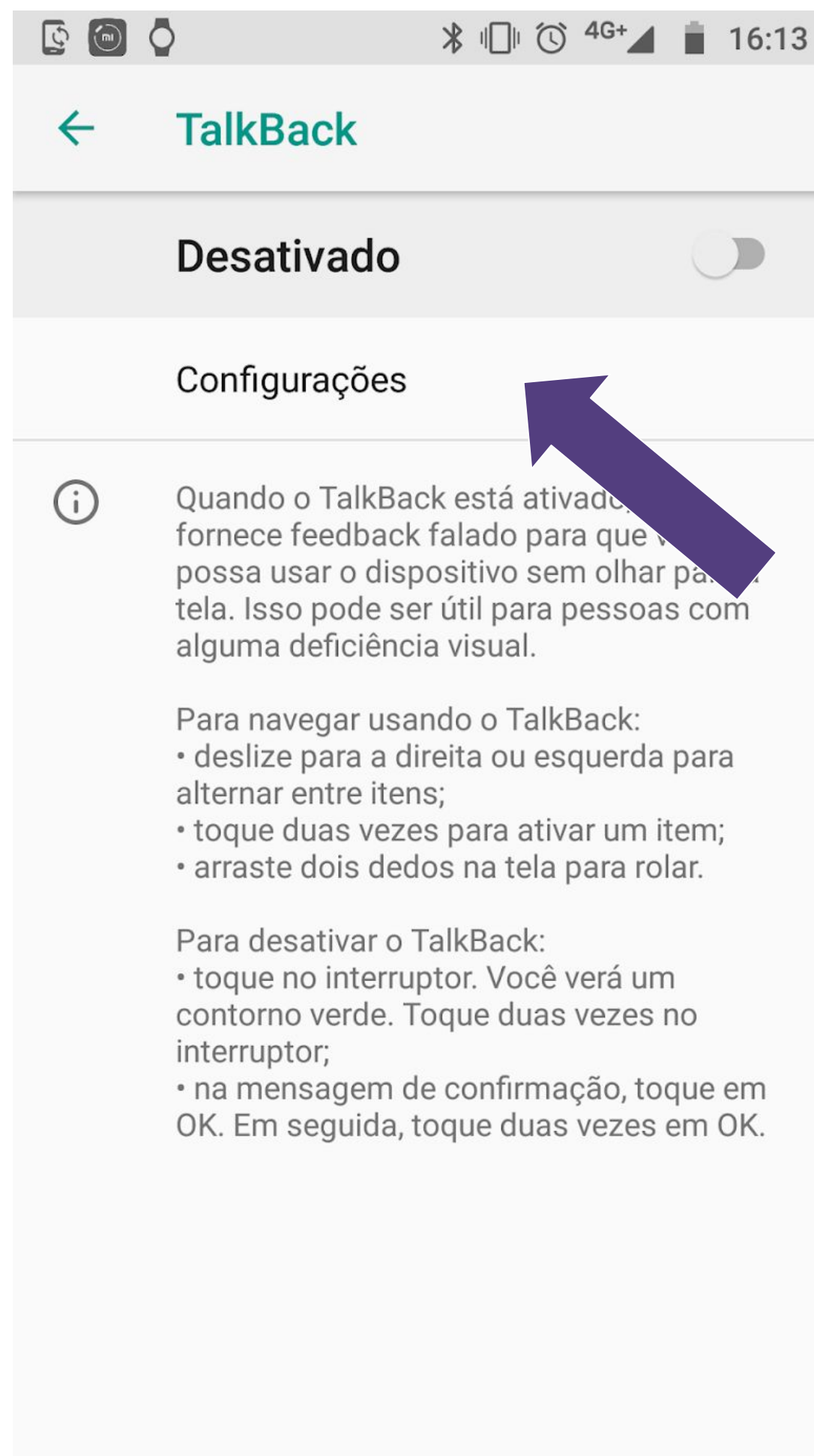
Provê o feedback do que está na tela por áudio.



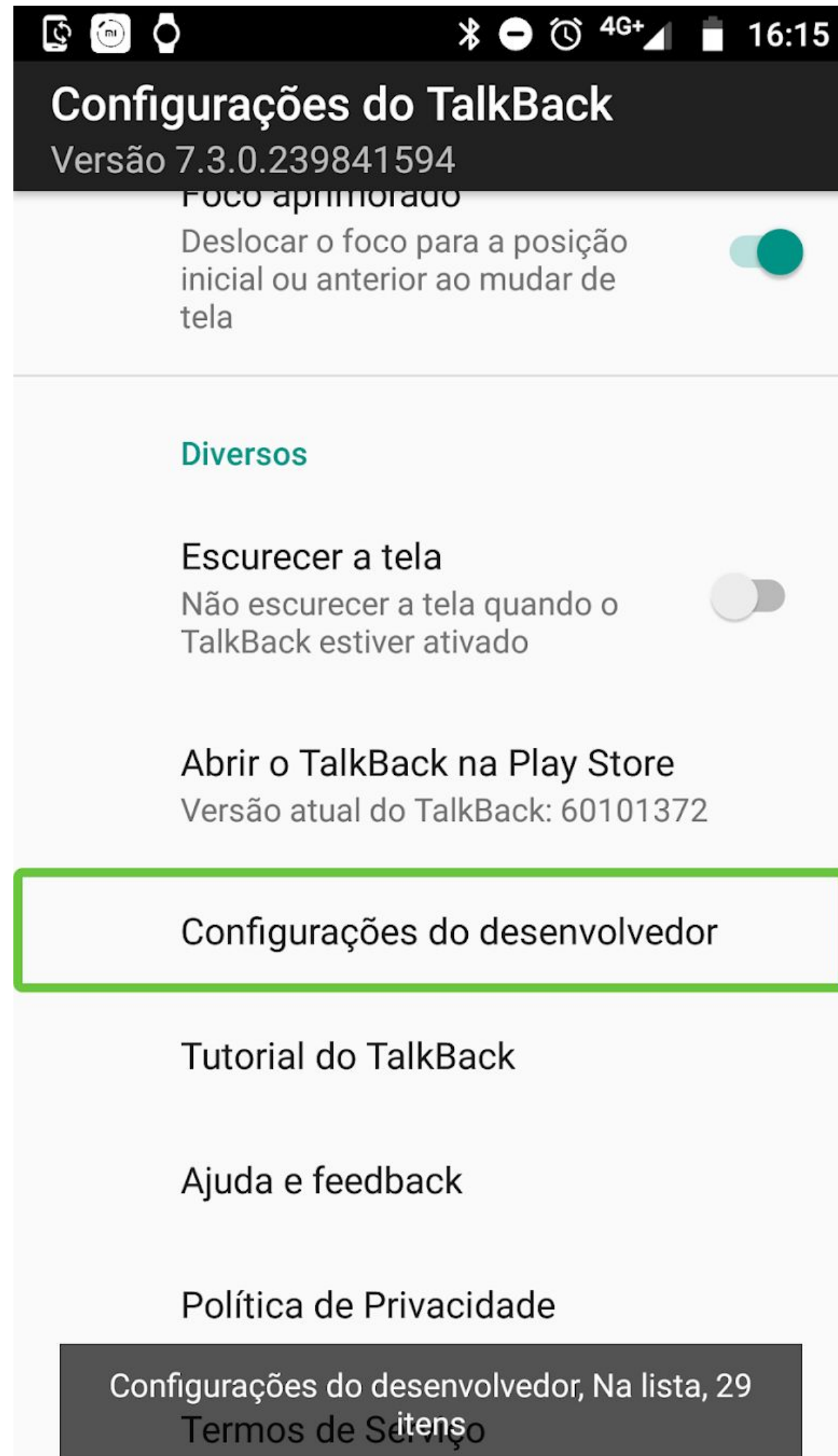
Talkback



Talkback



Talkback



Talkback

Configurações de desenvolvedor -> Ativar depuração da árvore de nós

Configurações de desenvolvedor -> Registrar nível de saída -> VERBOSE

Gestos -> Definir um gesto para imprimir árvore de nós

```
V/TreeDebug: Window: AccessibilityWindowInfo[title=Ordem de leituraid=289, type=TYPE_APPLICATION, layer
V/TreeDebug: (-2147455521)289.FrameLayout:(0, 0 - 1080, 1920):A
V/TreeDebug: (55035)289.ImageButton:(0, 63 - 147, 210):CD{Navigate up}:FAC:focusable:clickable
V/TreeDebug: (55996)289.TextView:(189, 101 - 583, 172):TEXT{Ordem de leitura}:A:supportsTextLocation
V/TreeDebug: (56957)289.TextView:(382, 505 - 698, 640):TEXT{Primeiro texto}:A:supportsTextLocation
V/TreeDebug: (54074)289.View:(380, 935 - 701, 1499):a:focusable:focused:accessibilityFocused
```

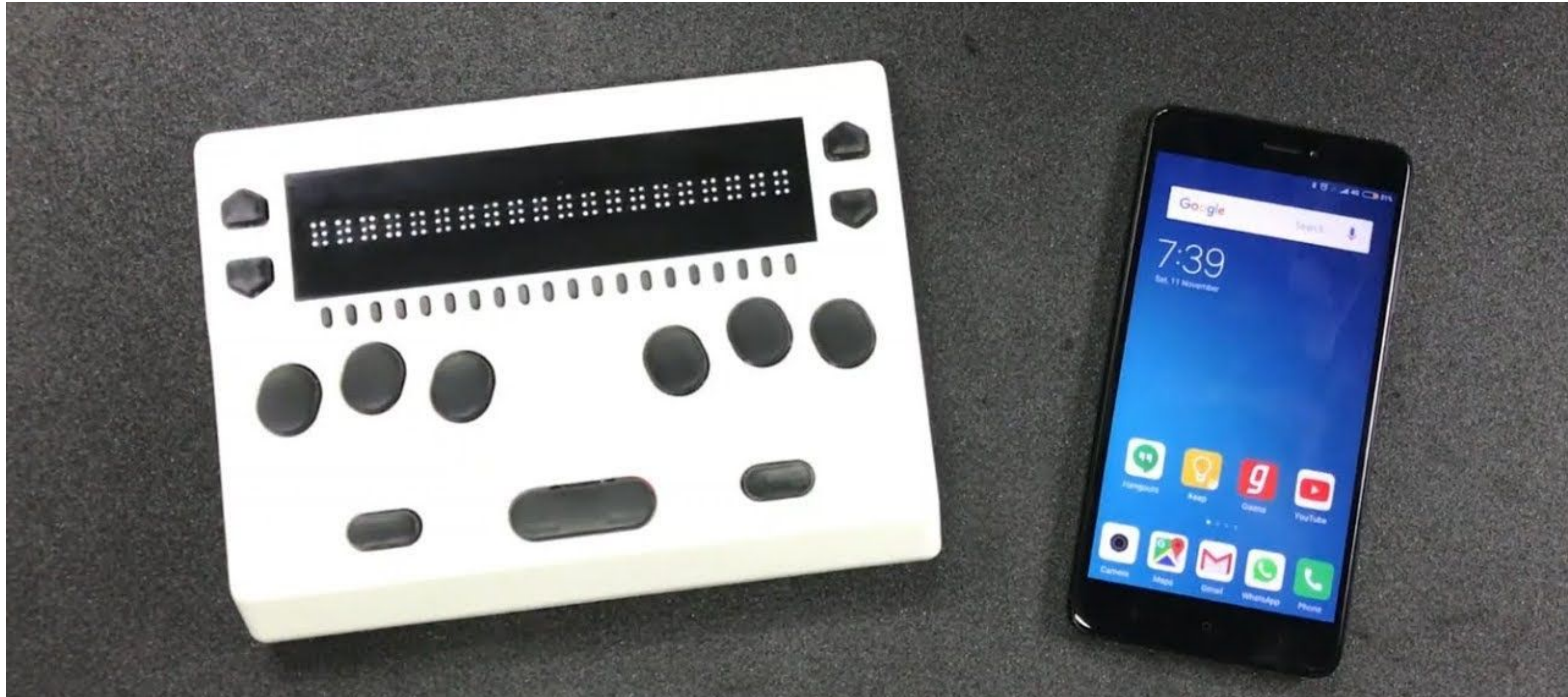
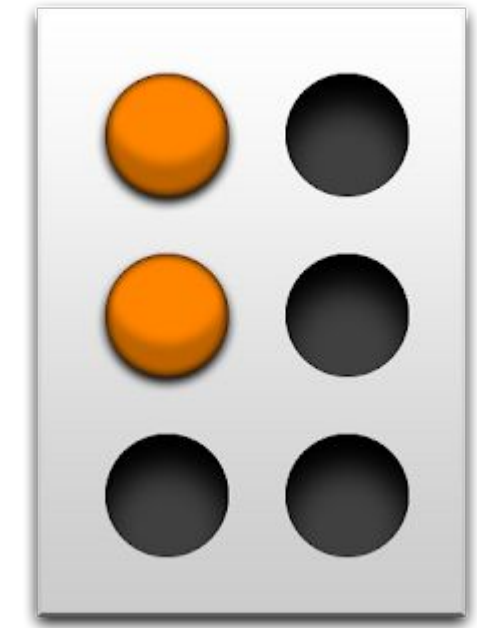

Voice Access



Switch Access



Brailleback



Diversos outros serviços

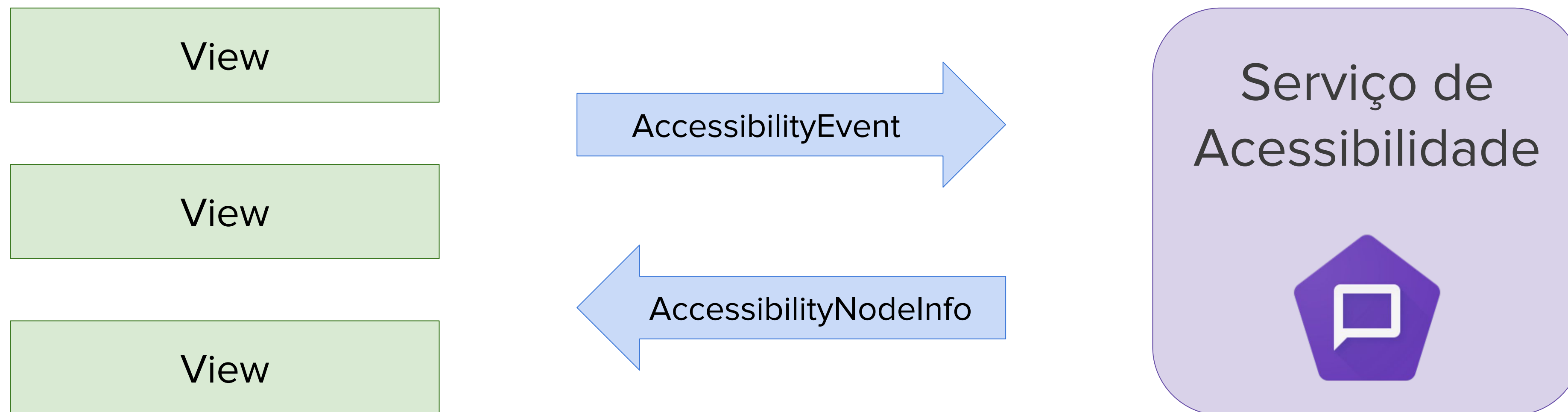
- - Selecionar para ouvir
 - Ampliação
 - Tamanho da fonte/exibição
 - Correção/inversão de cor
 - Audio mono
 - Texto em alto contraste





Framework de Acessibilidade

Accessibility Framework



Accessibility Framework



```
V/TreeDebug: Window: AccessibilityWindowInfo[title=nullid=142, type=TYPE_SYSTEM, layer=231000, bounds=Rect(0, 1794 - 1080, 1920), focused=false,
V/TreeDebug: (49122)142.FrameLayout:(0, 1794 - 1080, 1920):A
V/TreeDebug: (35668)142.FrameLayout:(0, 1794 - 1080, 1920):A
V/TreeDebug: (50083)142.FrameLayout:(435, 1794 - 645, 1920):FAC:focusable:clickable
V/TreeDebug: (43356)142.ImageView:(435, 1794 - 645, 1920):CD{Home}:FACL:focusable:clickable:longClickable
V/TreeDebug: (48161)142.ImageView:(141, 1794 - 340, 1920):CD{Back}:FACL:focusable:clickable:longClickable
V/TreeDebug: (51044)142.ImageView:(738, 1794 - 938, 1920):CD{Overview}:FACL:focusable:clickable:longClickable
V/TreeDebug: Window: AccessibilityWindowInfo[title=nullid=141, type=TYPE_SYSTEM, layer=181000, bounds=Rect(0, 0 - 1080, 63), focused=false, acti
V/TreeDebug: (123118)141.FrameLayout:(0, 0 - 1080, 63):A
V/TreeDebug: (193271)141.ImageView:(37, 0 - 100, 63):CD{Google Play Store notification: Google Play Protect is turned on}:A
V/TreeDebug: (134650)141.ImageView:(100, 0 - 163, 63):CD{Android System notification: USB debugging connected}:A
V/TreeDebug: (135611)141.ImageView:(163, 0 - 226, 63):CD{Android System notification: Virtual SD card}:A
V/TreeDebug: (153870)141.FrameLayout:(790, 9 - 838, 54):CD{Wifi signal full.}:A
V/TreeDebug: (158675)141.LinearLayout:(838, 9 - 883, 54):CD{LTE Phone two bars.}:A
V/TreeDebug: (170207)141.LinearLayout:(901, 0 - 926, 63):CD{Battery charging, 100 percent.}:A
V/TreeDebug: (122157)141.TextView:(926, 0 - 1038, 63):TEXT{10:16}:CD{10:16 PM}:A:supportsTextLocation
V/TreeDebug: Window: AccessibilityWindowInfo[title=Ordem de leituraid=289, type=TYPE_APPLICATION, layer=21060, bounds=Rect(0, 0 - 1080, 1920), f
V/TreeDebug: (-2147455521)289.FrameLayout:(0, 0 - 1080, 1920):A
V/TreeDebug: (55035)289.ImageButton:(0, 63 - 147, 210):CD{Navigate up}:FAC:focusable:clickable
V/TreeDebug: (55996)289.TextView:(189, 101 - 583, 172):TEXT{Ordem de leitura}:A:supportsTextLocation
V/TreeDebug: (56957)289.TextView:(382, 505 - 698, 640):TEXT{Primeiro texto}:A:supportsTextLocation
V/TreeDebug: (54074)289.View:(380, 935 - 701, 1499):a:focusable:focused:accessibilityFocused
```


Accessibility Framework



```
ViewCompat.setAccessibilityDelegate(view, object : AccessibilityDelegateCompat() {  
    override fun onInitializeAccessibilityNodeInfo(host: View?, info: AccessibilityNodeInfoCompat?) {  
        info?.isEnabled = true  
        super.onInitializeAccessibilityNodeInfo(host, info)  
    }  
  
    override fun onPopulateAccessibilityEvent(host: View?, event: AccessibilityEvent?) {  
        if (event?.eventType != AccessibilityEvent.TYPE_VIEW_TEXT_CHANGED) {  
            super.onPopulateAccessibilityEvent(host, event)  
        }  
    }  
})
```


Accessibility Framework

- - Todos os widgets suportam nativamente
 - CustomViews devem disponibilizar manualmente
 - Limites da view
 - Descrição
 - Ações suportadas

Boas práticas



Não dependa apenas de cores

Description

Let me only say that it fared with him as with the storm-tossed ship, that miserably drives along the leeward land

exceeded the maximum characters 130 / 120

Sim

Description

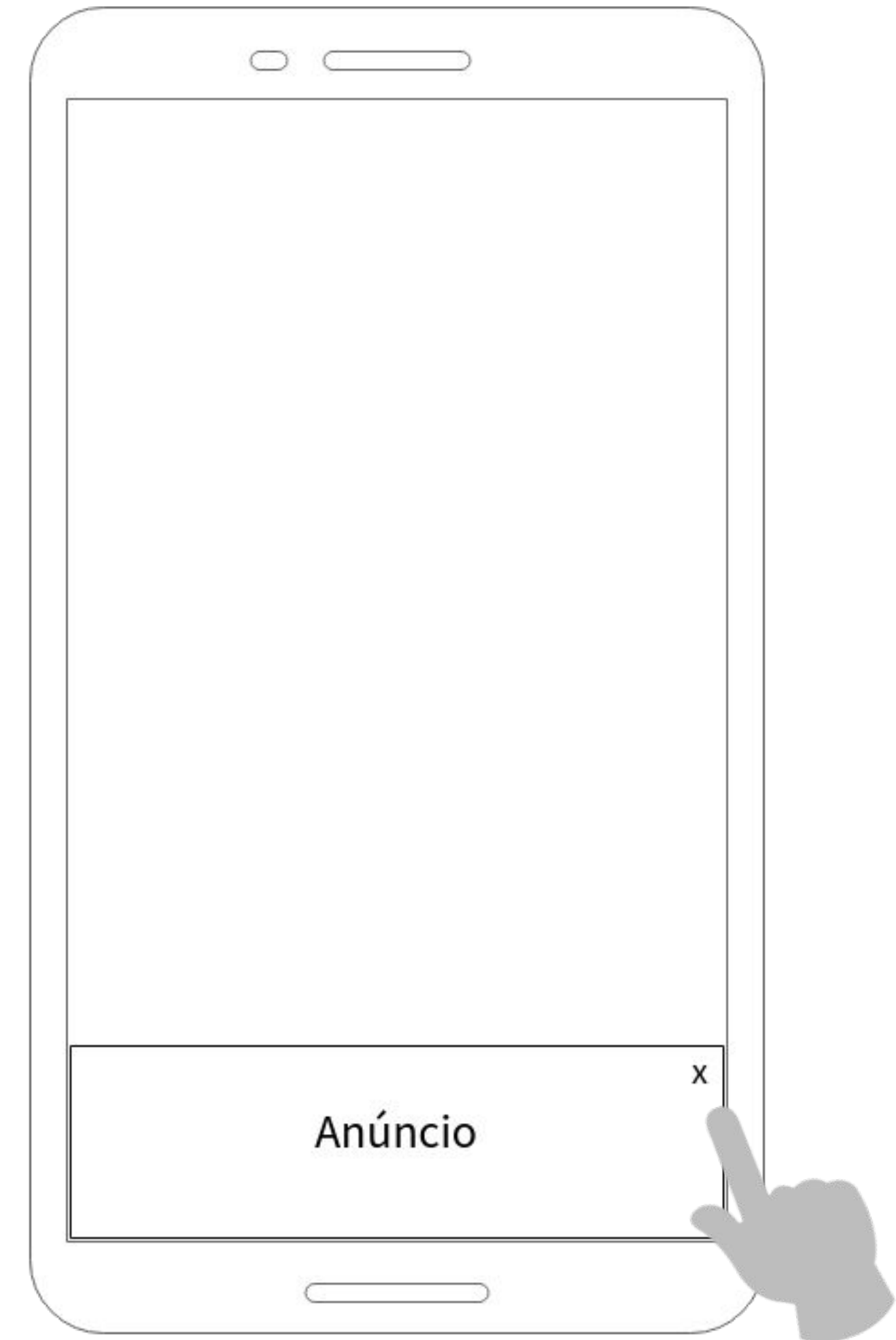
Let me only say that it fared with him as with the storm-tossed ship, that miserably drives along the leeward land

Não

Tamanho mínimo da área de toque

48dp x 48dp

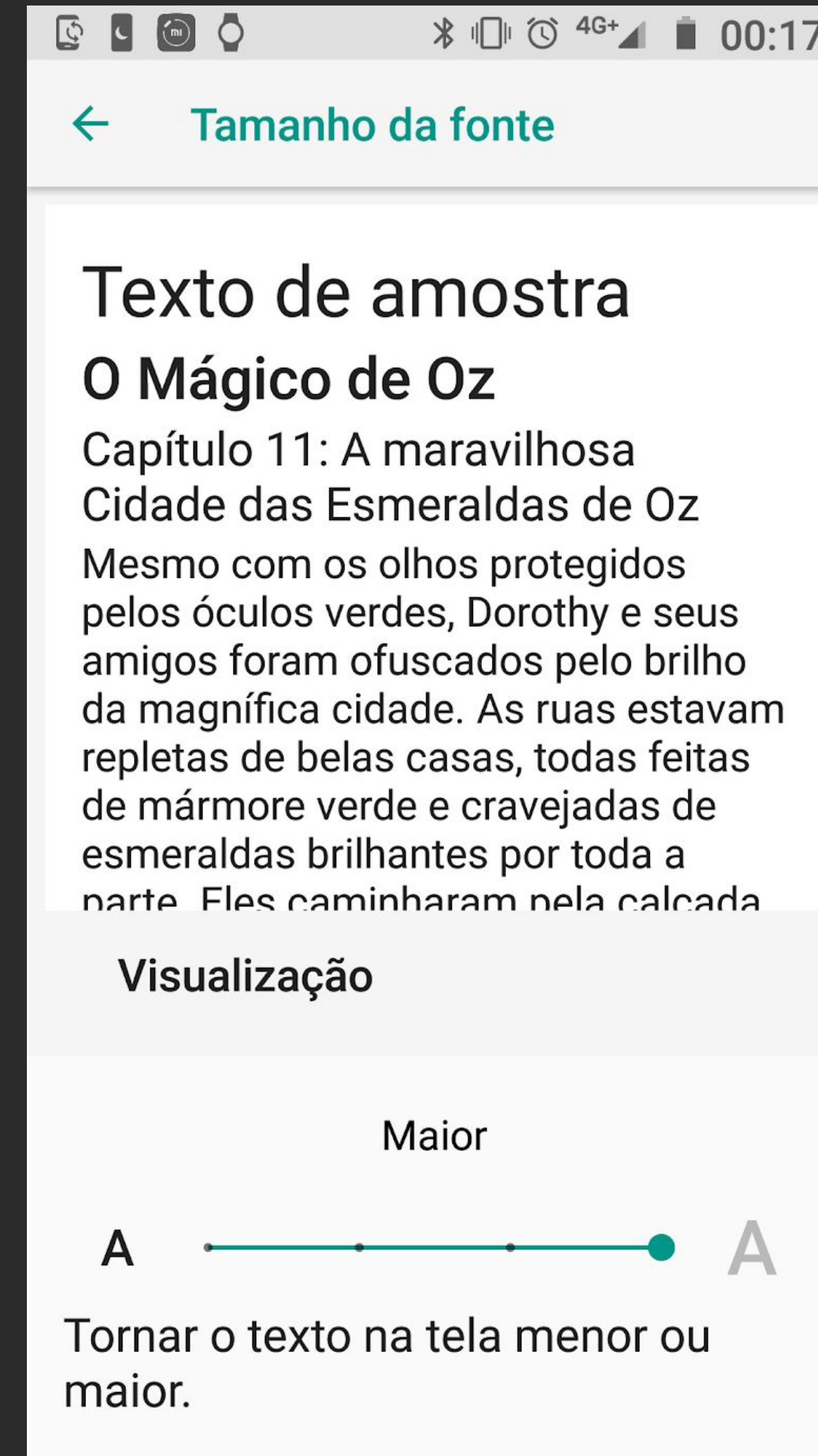
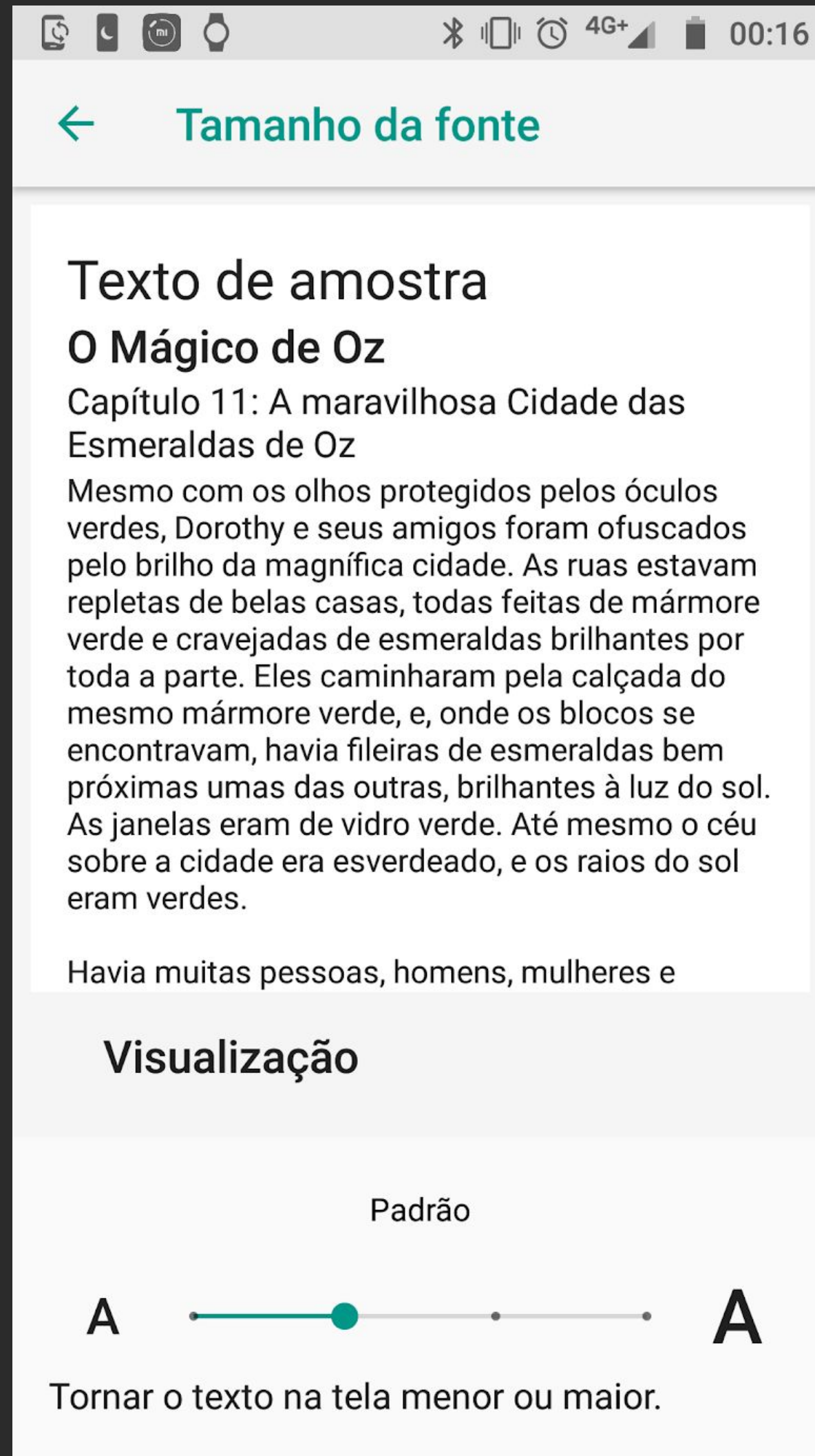
Distância de 8dp



Use SP para textos

```
<TextView  
    android:layout_width="wrap_content"  
    android:layout_height="wrap_content"  
    android:textSize="14sp"  
    android:text="@string/text" />
```


Use SP para textos



Descrição de conteúdo

```
<ImageView  
    android:layout_width="wrap_content"  
    android:layout_height="wrap_content"  
    android:contentDescription="@string/accessible_description"  
    android:textSize="14sp"  
    app:srcCompat="@drawable/ic_icon" />
```


Descrição de conteúdo

```
<ImageView  
    android:layout_width="wrap_content"  
    android:layout_height="wrap_content"  
    android:importantForAccessibility="no"  
    android:textSize="14sp"  
    app:srcCompat="@drawable/ic_icon" />
```

Quando a imagem é apenas ilustrativa

Descrição de conteúdo

Não indique estado ou tipo de elemento no texto de descrição

```
ViewCompat.setAccessibilityDelegate(ivImageView, object : AccessibilityDelegateCompat() {  
    override fun onInitializeAccessibilityNodeInfo(host: View?, info: AccessibilityNodeInfoCompat?) {  
        info?.className = Button::class.java.name  
        super.onInitializeAccessibilityNodeInfo(host, info)  
    }  
})
```

```
ViewCompat.setAccessibilityDelegate(ivImageView, object : AccessibilityDelegateCompat() {  
    override fun onInitializeAccessibilityNodeInfo(host: View?, info: AccessibilityNodeInfoCompat?) {  
        info?.isHeading = true  
        super.onInitializeAccessibilityNodeInfo(host, info)  
    }  
})
```


Contraste de cores

Garanta um contraste suficiente entre a cor de fundo e a cor do texto

<https://contrastchecker.com>



SAMPLE TEXT SAMPLE TEXT
sample text sample text

Foreground

#00179C
RGB(0,23,156)

Background

#E6E6E6
RGB(230,230,230)

Ratio

10.5



SAMPLE TEXT SAMPLE TEXT
sample text sample text

#6671B0
RGB(102,113,176)

#E6E6E6
RGB(230,230,230)

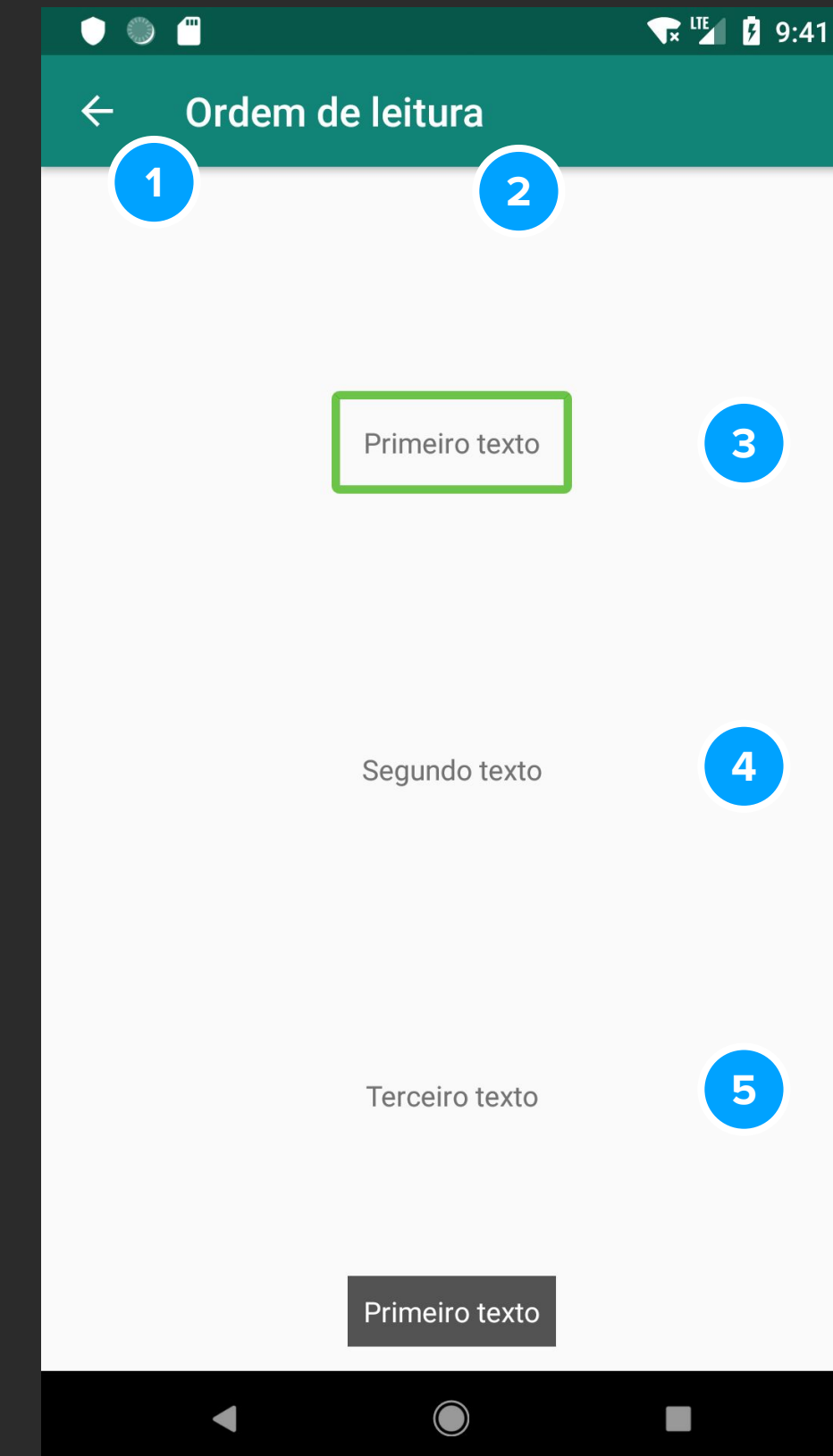
3.69

Ordem de leitura

Garanta uma navegação consistente

```
<TextView
    android:id="@+id/secondView"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Segundo texto"
    android:accessibilityTraversalAfter="@id/thirdView"/>
```

```
ViewCompat.setAccessibilityDelegate(secondView, object : AccessibilityDelegateCompat() {
    override fun onInitializeAccessibilityNodeInfo(host: View?, info: AccessibilityNodeInfoCompat?) {
        info?.setTraversalAfter(thirdView)
        super.onInitializeAccessibilityNodeInfo(host, info)
    }
})
```



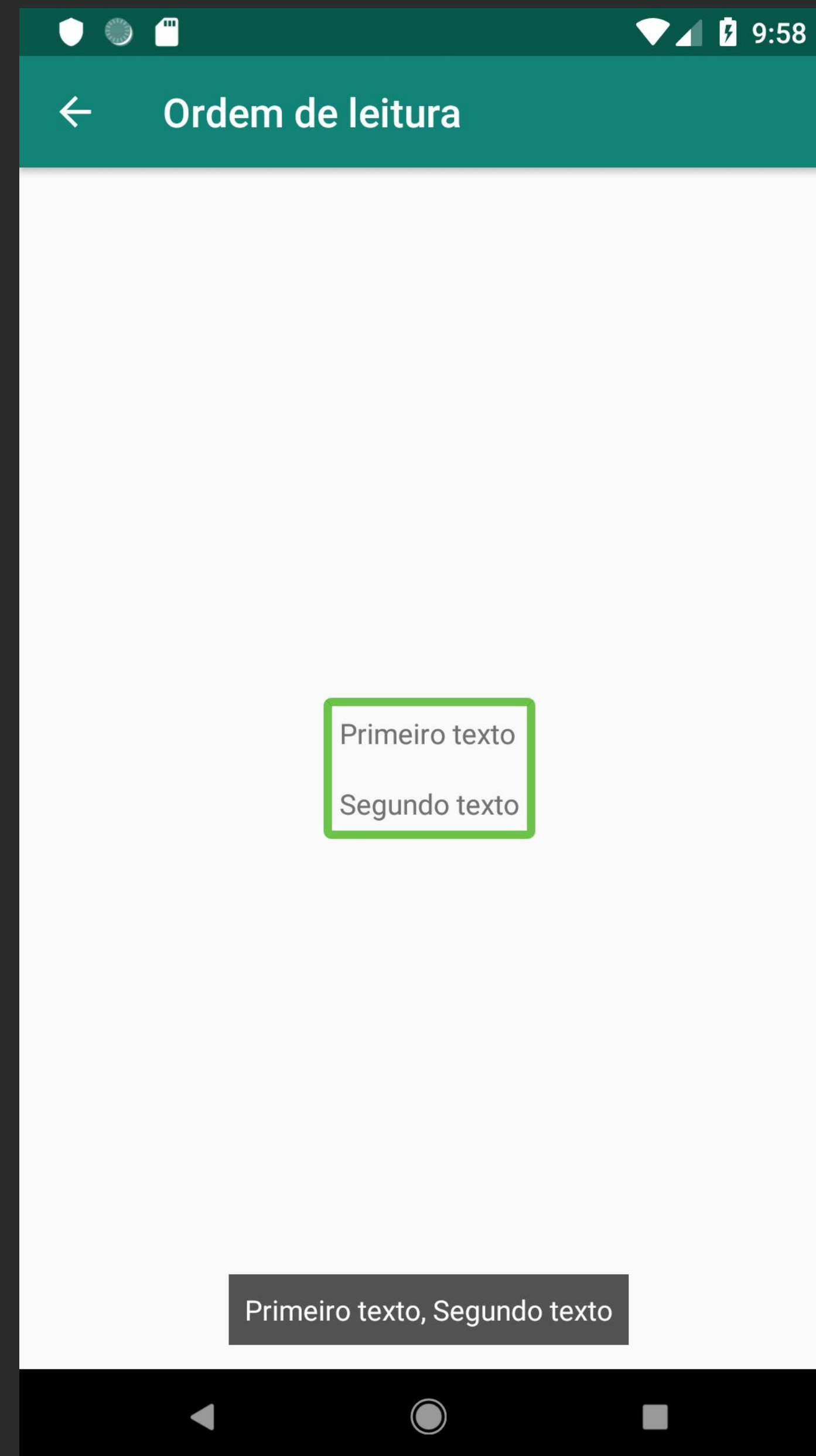
Agrupar leitura

```
<LinearLayout
  android:layout_width="wrap_content"
  android:layout_height="wrap_content"
  android:focusable="true"
  android:importantForAccessibility="yes"
  android:orientation="vertical"
  android:padding="8dp">

  <TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:importantForAccessibility="no"
    android:text="Primeiro texto" />

  <TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="16dp"
    android:importantForAccessibility="no"
    android:text="Segundo texto" />

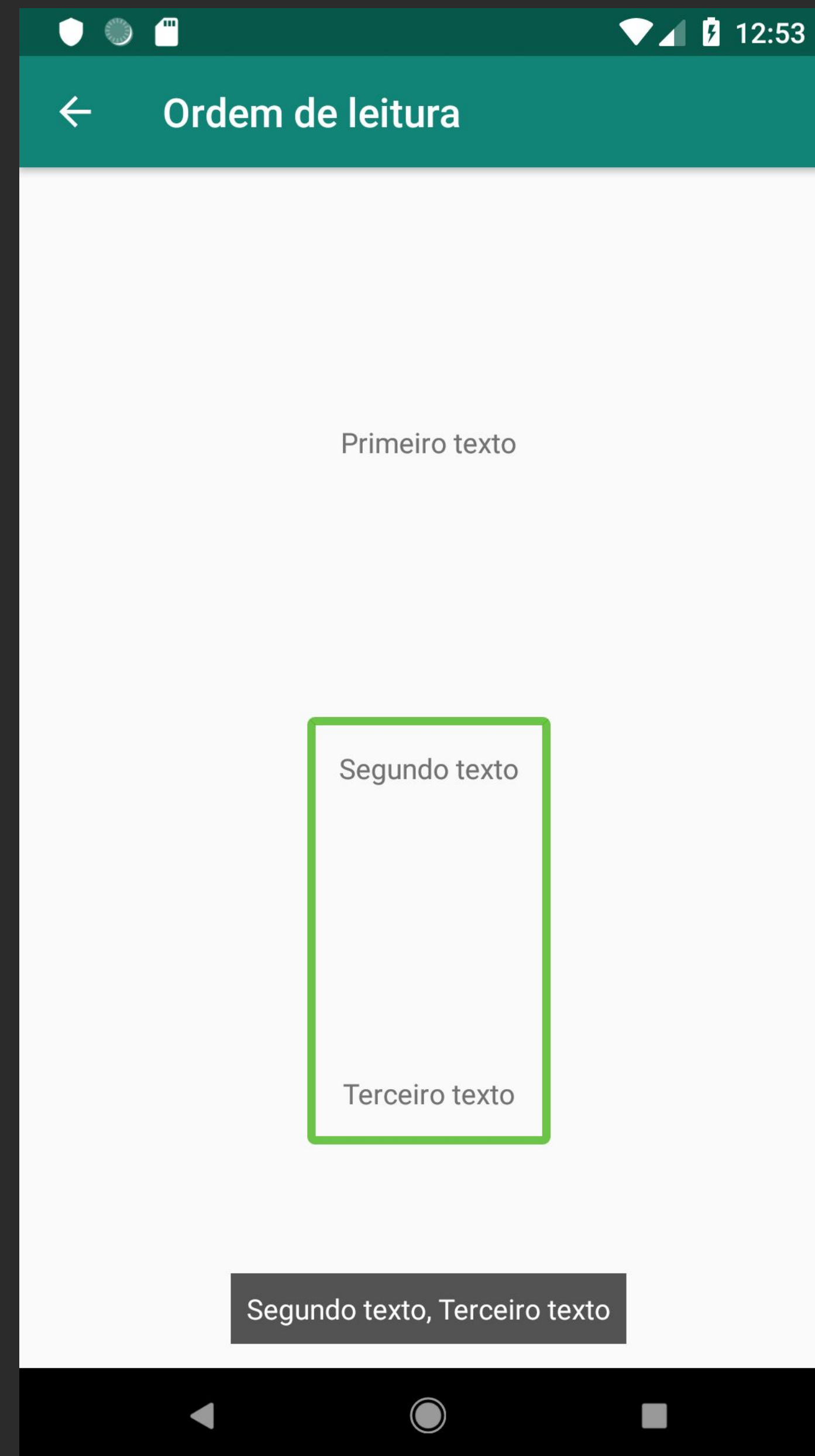
</LinearLayout>
```



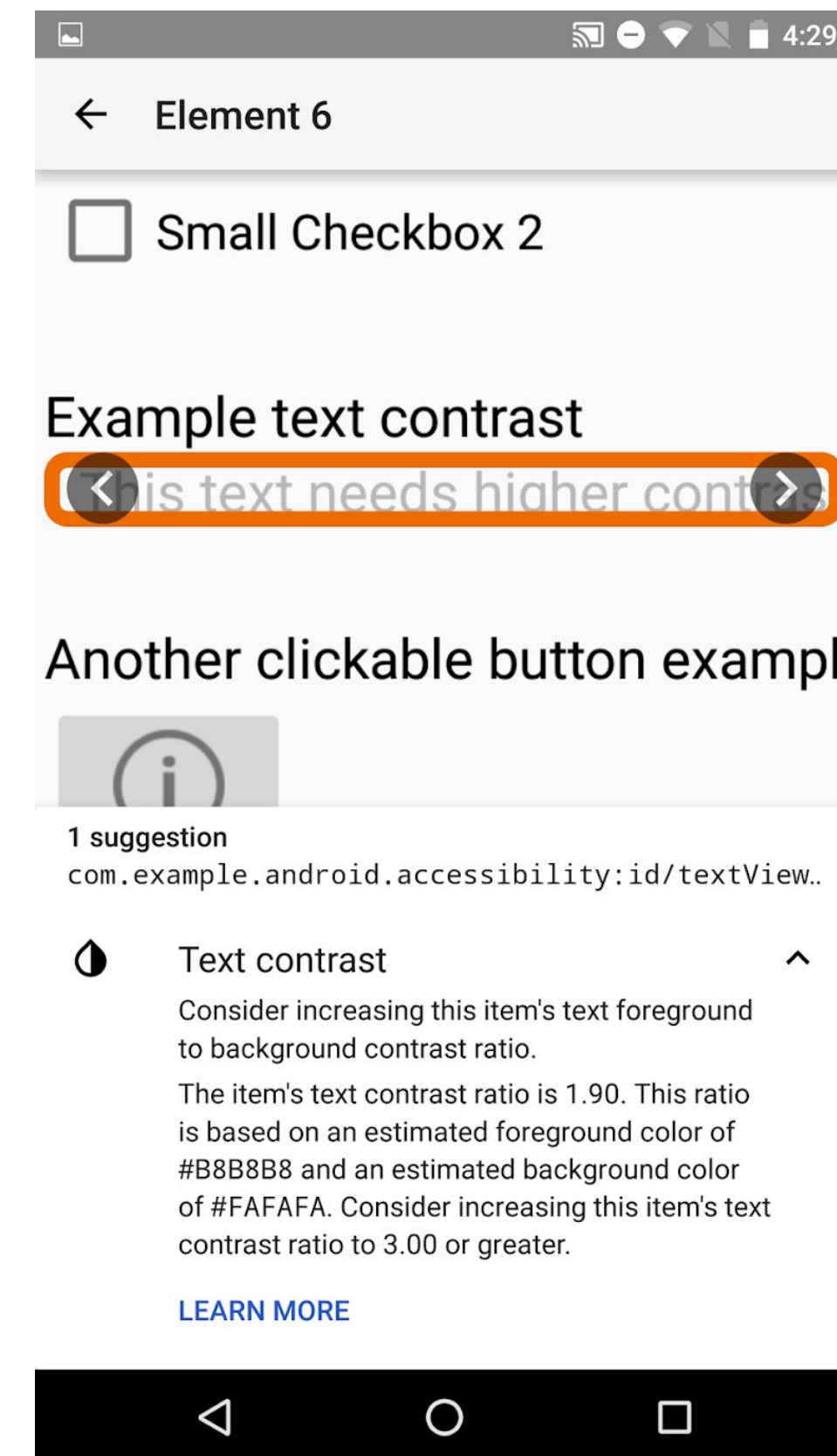
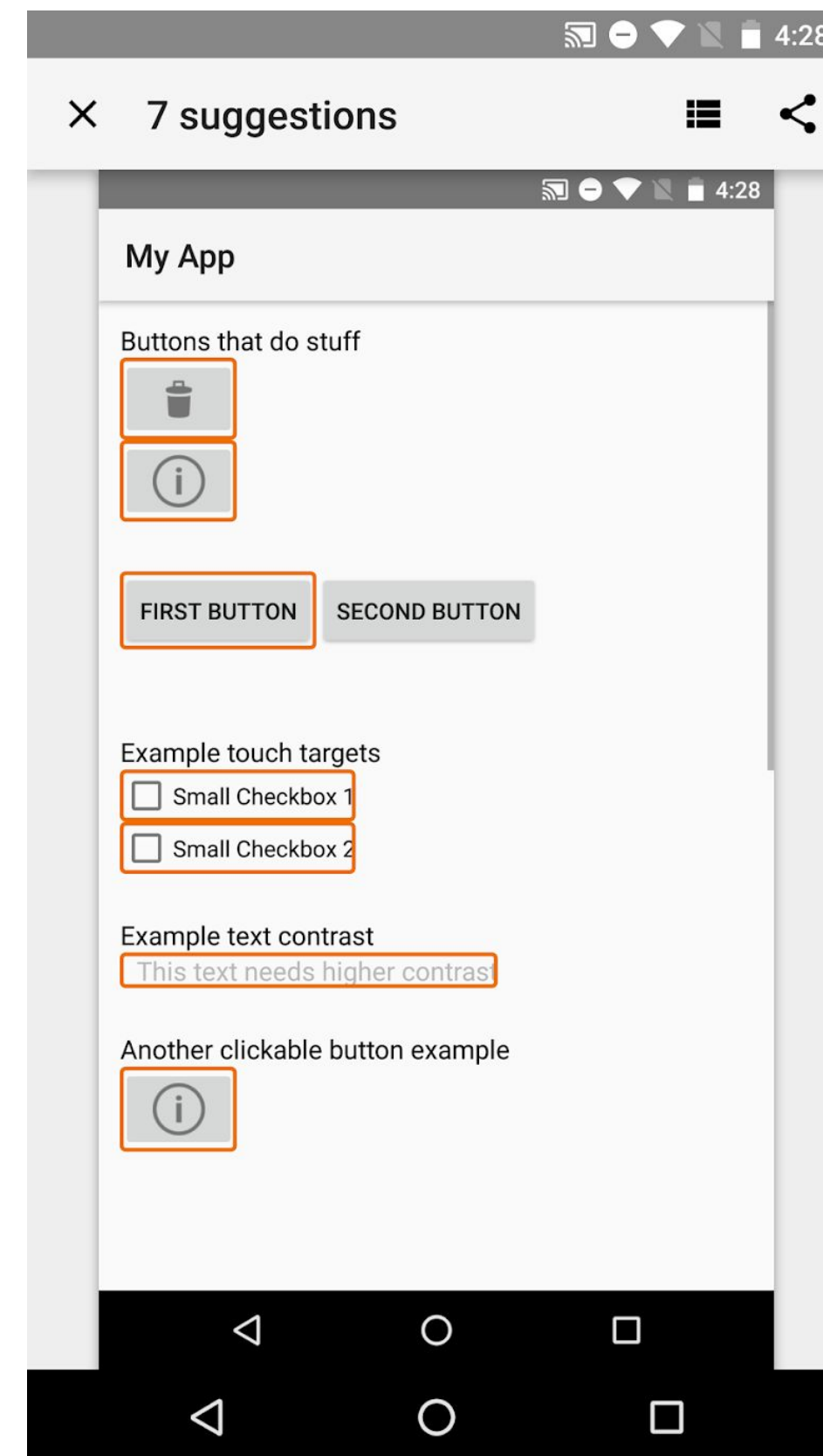
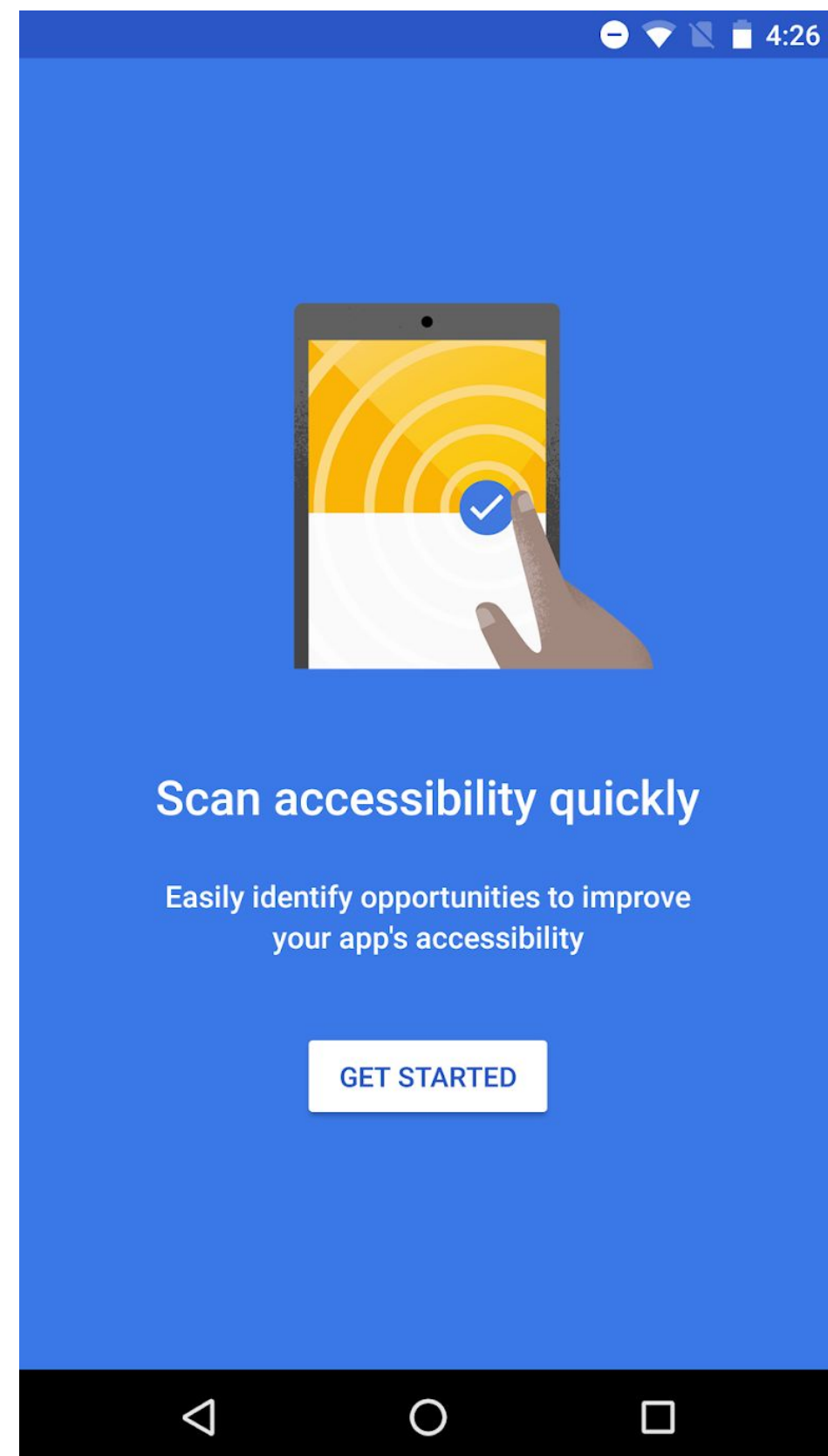
Agrupar leitura

```
<View  
    android:layout_width="0dp"  
    android:layout_height="0dp"  
    android:importantForAccessibility="yes"  
    android:focusable="true"  
    app:layout_constraintTop_toTopOf="@id/secondView"  
    app:layout_constraintBottom_toBottomOf="@id/thirdView"  
    app:layout_constraintStart_toStartOf="@id/secondView"  
    app:layout_constraintEnd_toEndOf="@id/secondView"/>
```

```
view.contentDescription = "${secondView.text}, ${thirdView.text}"
```



Accessibility Scanner

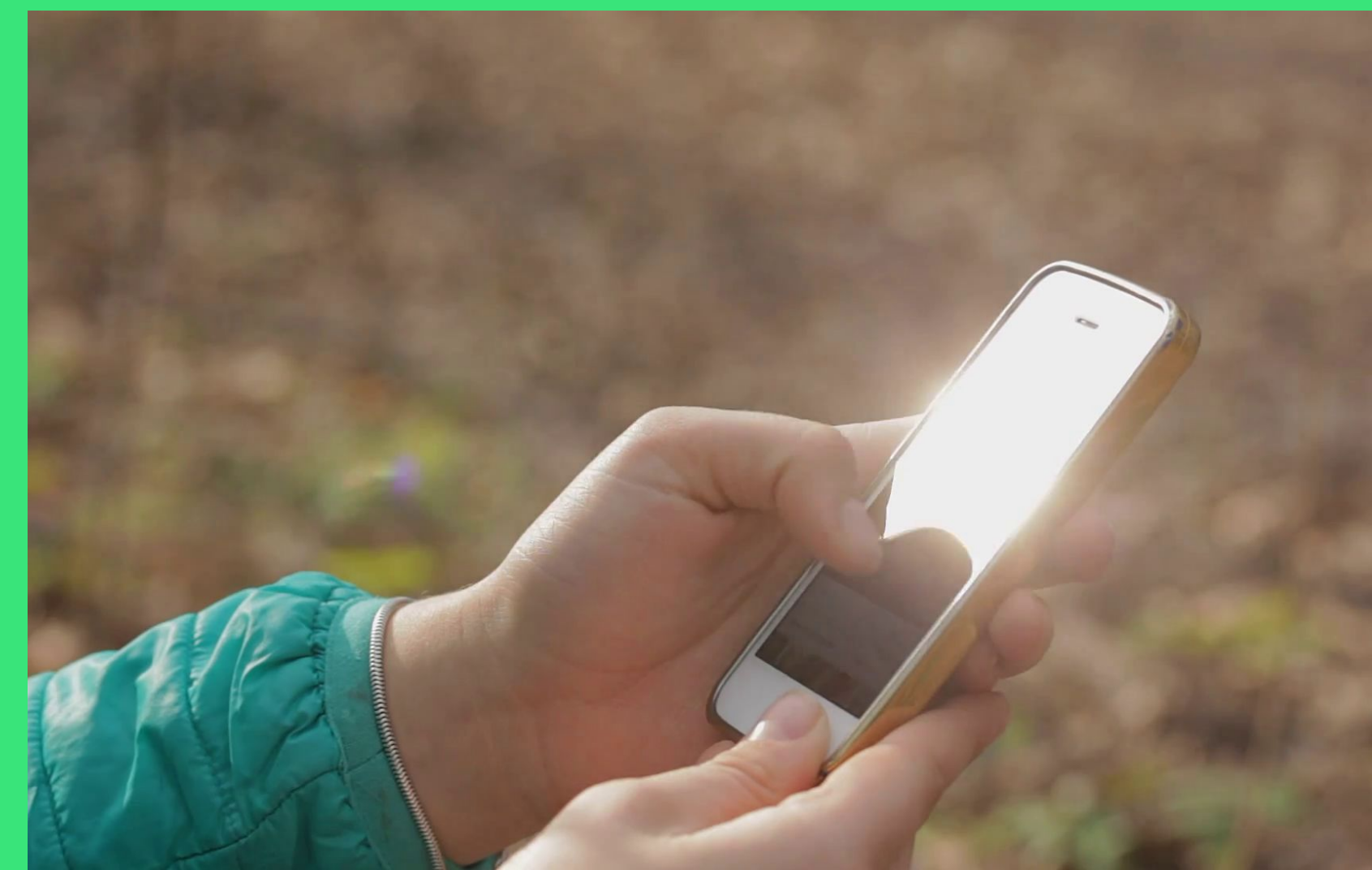


Não deixe para última hora

Nem deixe de fazer



Empatia



Links

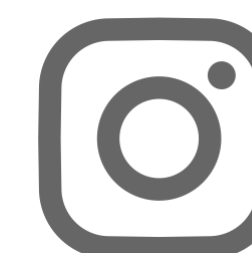
-
- <https://developer.android.com/guide/topics/ui/accessibility>
- <https://material.io/design/usability/accessibility.html#hierarchy>
- <http://acessibilida.de/>
- <https://medium.com/android-dev-br/acessibilidade-para-aplica%C3%A7%C3%B5es-android-b461da054a15>
- <https://estudoinclusivo.com.br/>
- <https://concrete.com.br/2019/03/18/acessibilidade/>
- http://www.sidi.org.br/guiadeacessibilidade/index.html#testadores_estrategia
- <https://www.microsoft.com/design/inclusive/>

Obrigado!

Perguntas?

Estou nas redes sociais

@diegomalone



concrete
PART OF ACCENTURE

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