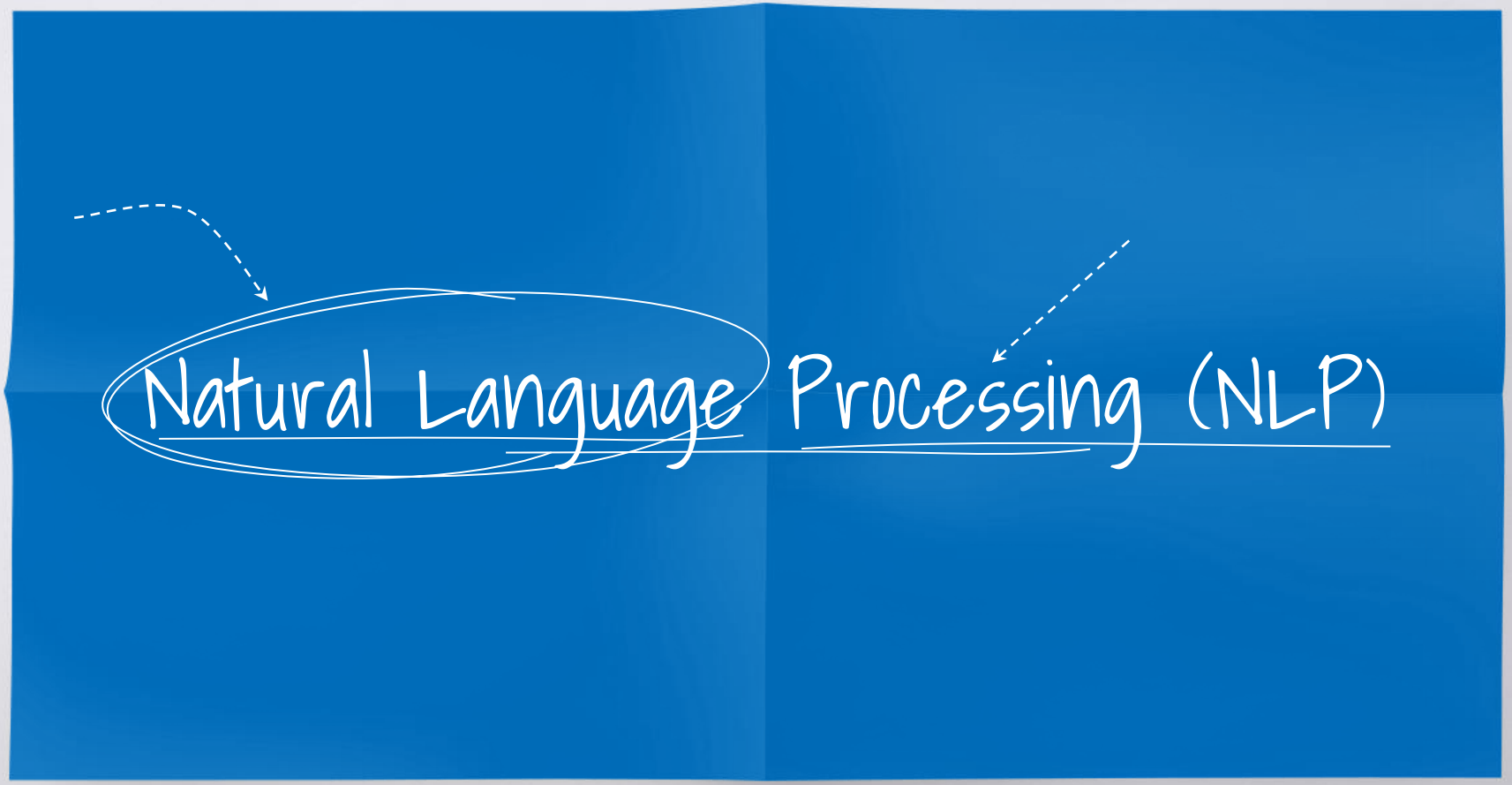

Natural Language Processing (NLP)

Natural Language Processing (NLP) workloads :

- Natural language processing (NLP) is a branch of artificial intelligence that helps computers understand, interpret and manipulate human language.
- Features of common NLP Workload Scenarios
  - Identify features and uses for key phrase extraction
  - Identify features and uses for entity recognition
  - Identify features and uses for sentiment analysis
  - Identify features and uses for language modeling
  - Identify features and uses for speech recognition and synthesis
  - Identify features and uses for translation

Key Phrase Extraction vs Entity recognition vs Sentiment analysis

Key Phrase Extraction

- Key phrase extraction is the concept of evaluating the text of a document, or documents, and then identifying the main talking points of the document(s).

"We had dinner here for a birthday celebration and had a fantastic experience. We were greeted by a friendly hostess and taken to our table right away. The ambiance was relaxed, the food was amazing, and service was terrific. If you like great food and attentive service, you should try this place." .

Extracted the following phrases:

- *attentive service*
- *great food*
- *birthday celebration*
- *fantastic experience*
- *friendly hostess*

- Key phrase extraction works better when you provide it with bigger amounts of text to work on.

Entity recognition

- Return a list of entities in the text that it recognizes.
- The service can also provide links to more information about that entity on the web.
- An entity is essentially an item of a particular type or a category; and in some cases, subtype, such as those as shown in the following table.

"I ate at the restaurant in Seattle last week."

Entity	Type	SubType	Wikipedia URL
Seattle	Location		https://en.wikipedia.org/wiki/Seattle
last week	DateTime	DateRange	

Sentiment analysis

- Sentiment analysis can evaluate text and return sentiment scores and labels for each sentence.
- This capability is useful for detecting positive and negative sentiment in social media, customer reviews, discussion forums and more.
- The service evaluates the text and returns a sentiment score in the range of 0 to 1, with values closer to 1 being a positive sentiment.
- Sentiment analysis performs better on smaller amounts of text. Less words means less distractors for the sentiment analysis model, and for that reason, it produces a higher-quality results with smaller amounts of text.

- For example, the following two restaurant reviews could be analyzed for sentiment:

Review one: *"We had dinner at this restaurant last night and the first thing I noticed was how courteous the staff was. We were greeted in a friendly manner and taken to our table right away. The table was clean, the chairs were comfortable, and the food was amazing."*

Review Two: *"Our dining experience at this restaurant was one of the worst I've ever had. The service was slow, and the food was awful. I'll never eat at this establishment again."*

Questions

Question: For each of the following statements about Sentiment Analysis, select Yes if the statement is true. Otherwise, select No.

Statement	Yes	No
Sentiment Analysis returns sentiment labels and scores for the entire document.	○	○
Sentiment Analysis returns sentiment labels and scores for each sentence within a document.	○	○
Confidence scores range from -1 to 1.	○	○

Questions

Question: Which two of the following can be found in a text document by using entity recognition? Each correct answer presents a complete solution.

A. Dates and times of a day
B. Intent and actions
C. Passport number
D. Main talking points
E. Emotion expressed

Question: Which requirement would require you to use sentiment analysis?

A. Find the use of brand names in documents.
B. Extract brand information from documents.
C. Transcribe the recording of a marketing presentation into text.
D. Analyze social media for a brand.

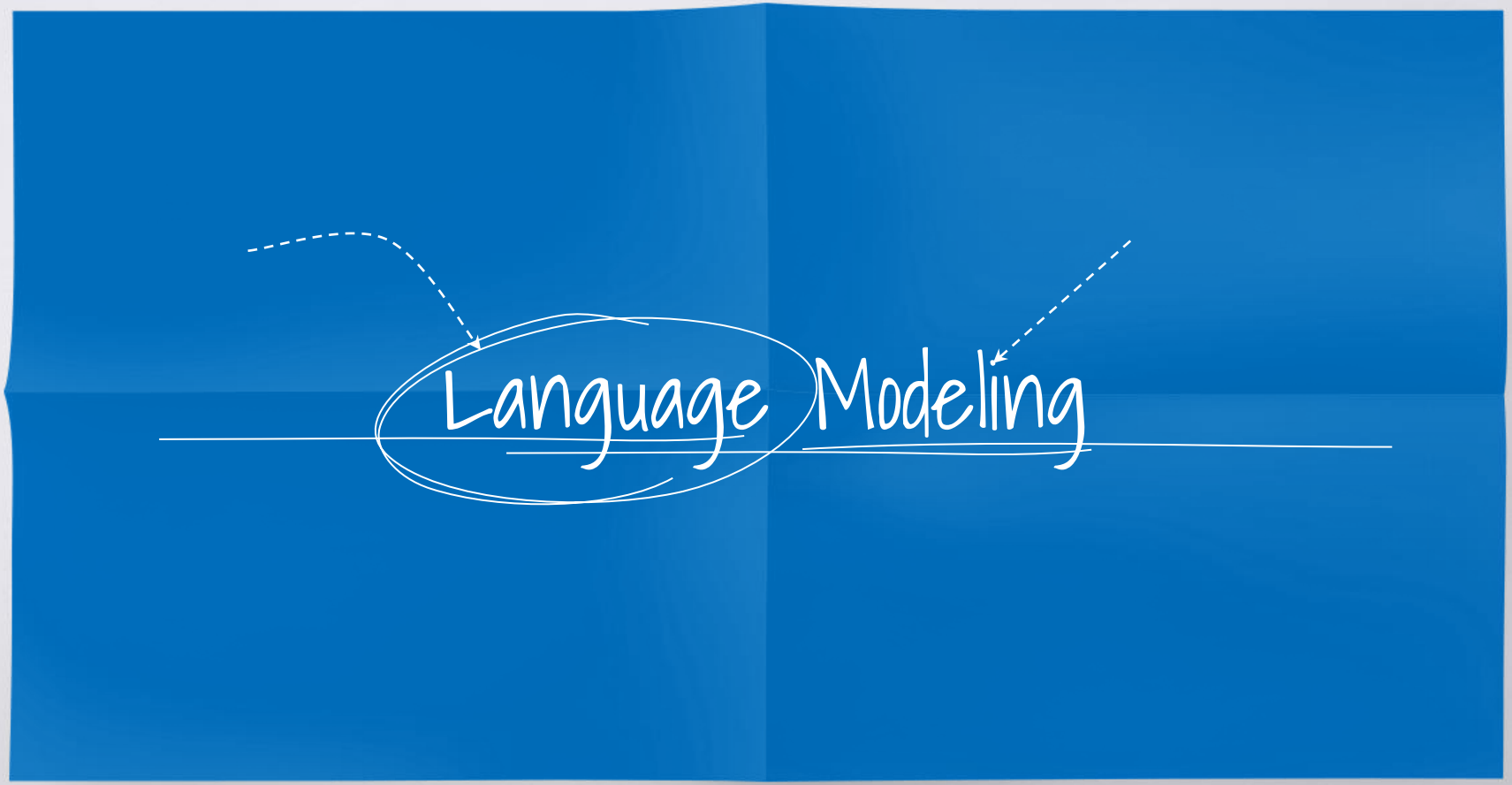
Questions

Select the correct option

- Understand how upset a customer is based on the text contained in the support ticket - **Sentiment Analysis**
  Summarize important information from the support ticket - **Key Phrase Extraction**
  Extract key dates from the support ticket - **Entity Recognition**

- Understand how upset a customer is based on the text contained in the support ticket - **Language Detection**
  Summarize important information from the support ticket - **Key Phrase Extraction**
  Extract key dates from the support ticket - **Entity Recognition**

- Understand how upset a customer is based on the text contained in the support ticket - **Sentiment Analysis**
  Summarize important information from the support ticket - **Entity Recognition**
  Extract key dates from the support ticket - **Key Phrase Extraction**


Language Modeling

Language Modeling

- Language understanding extracts the overall meaning from the text.
- The intent and actions expressed in a text are an example of language understanding.
- Common scenarios for this kind of solution include customer support applications, reservation systems, and home automation among others.
- Three core concepts: utterances, entities, and intents
- "Switch the fan on."
- "Turn on the light."

Statement
Language modeling can determine the emotion in a text statement.
Language modeling can discover the meaning in a text statement.
Language modeling can detect the language the text is written in.

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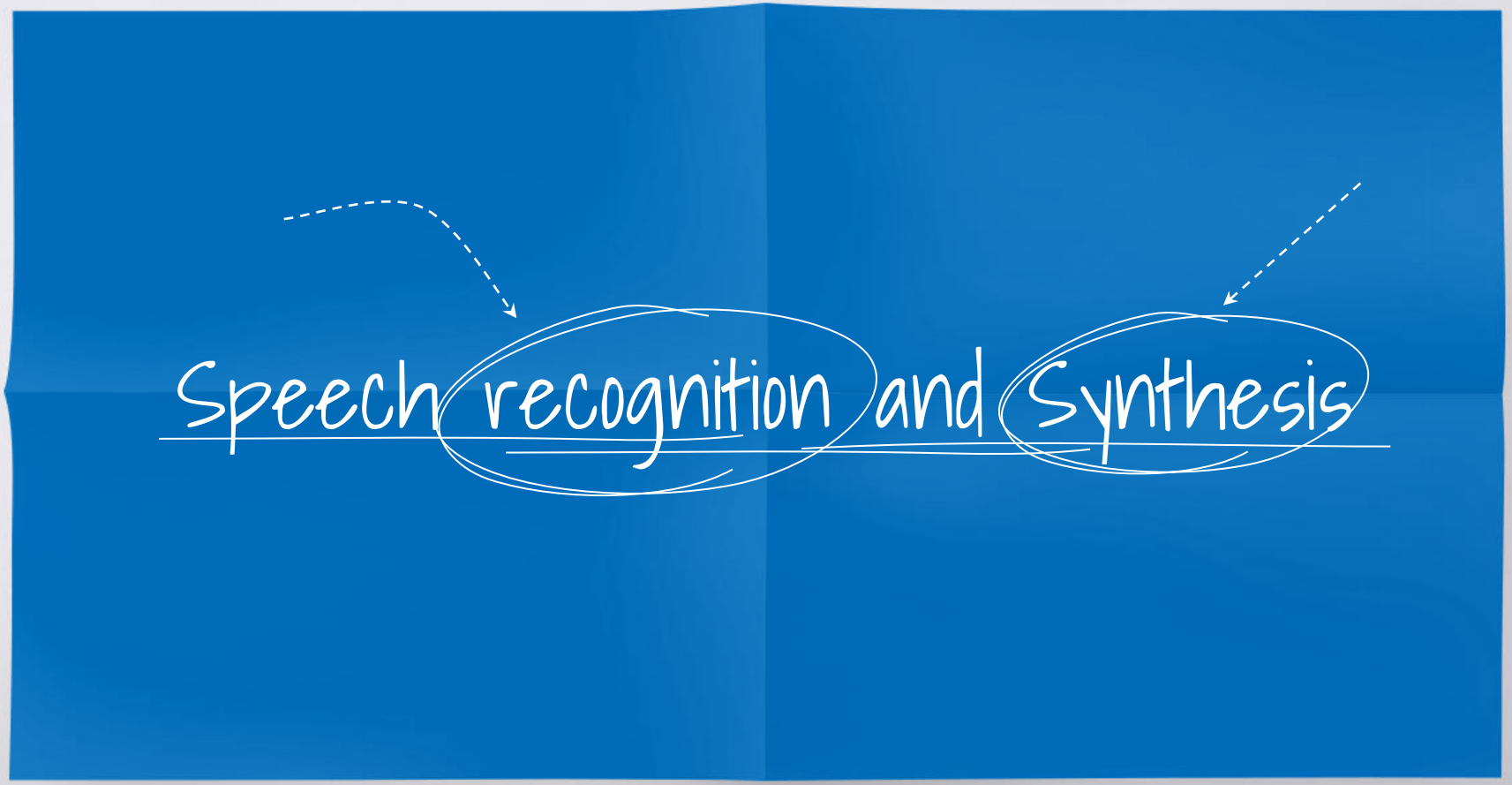
Statement	Yes	No
Language modeling can determine the emotion in a text statement.	○	◉
Language modeling can discover the meaning in a text statement.	◉	○
Language modeling can detect the language the text is written in.	○	◉


Speech recognition and Synthesis

Speech recognition and Synthesis

- Speech recognition is the ability to detect and interpret spoken input and turn it into data so it can be processed as text.
- Use Cases:
  - Providing closed captions for recorded or live videos
  - Creating a transcript of a phone call or meeting
  - Automated note dictation
  - Determining intended user input for further processing

- Speech synthesis is the ability to generate spoken output by converting text into audio speech.
- Speech synthesis is available in multiple languages.
- It and can be customized to adjust pitch, add pauses, improve pronunciation, etc. by using speech synthesis markup language (SSML).
- It helps people with disabilities, like vision impairment
- Use Cases:
  - Generating spoken responses to user input.
  - Creating voice menus for telephone systems.
  - Reading email or text messages aloud in hands-free scenarios.
  - Broadcasting announcements in public locations, such as railway stations or airports.

Question: Speech recognition and Synthesis

You need to build an app that will read recipe instructions aloud to support users who have reduced vision.

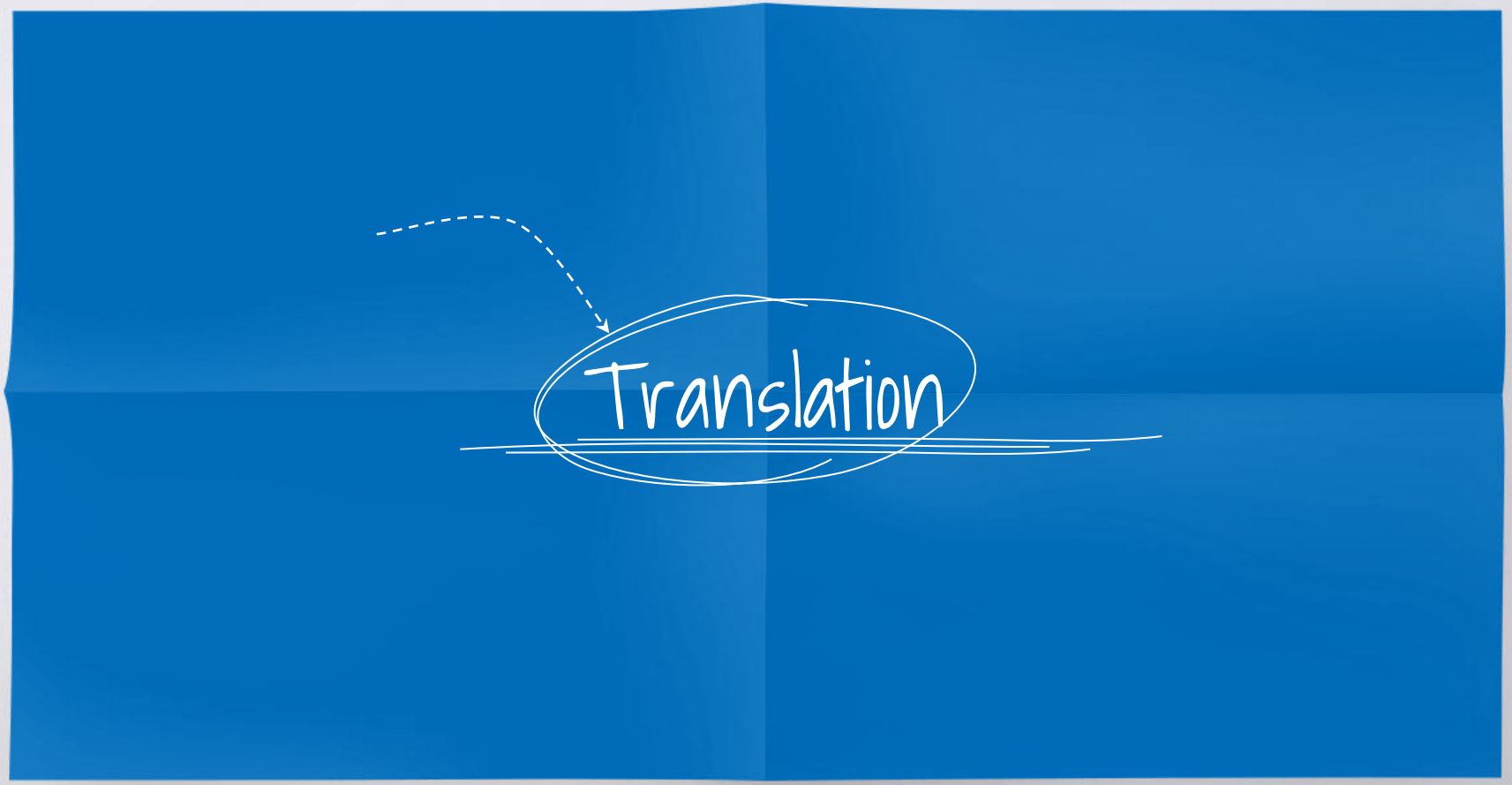
Which service will you use?

- ◯ Language Understanding
- ◯ Text Analytics
- ◯ Speech
- ◯ Translator Text

Question: Speech recognition and Synthesis

In which two scenarios can you use speech recognition?

- [ ] providing closed captions for recorded or live videos
- [ ] an in car system that reads text messages aloud
- [ ] creating an automated public address system for a train station
- [ ] creating a transcript of a telephone call or meeting


Translation

Translation

- Translation is the ability to translate either text or speech from one language to another.
- Why literal translation doesn't work?
  - There may not be an equivalent word in the target language.
  - Literal translation can change the meaning of the phrase or not get the context correct.
  - The French phrase "éteindre la lumière" can be translated to English as "turn off the light".
  - In French "fermer la lumiere" to mean the same thing but in English "close the light";

- Text and speech translation
  - Text translation can be used to translate documents from one language to another.
    - Translate email communications that come from foreign governments
    - Ability to translate web pages on the Internet.

  - Speech translation is used to translate between spoken languages, sometimes directly (speech-to-speech translation) and sometimes by translating to an intermediary text format (speech-to-text translation).


Azure tools and services for NLP

Azure Services for NLP

- Natural language processing (NLP) is a branch of artificial intelligence that helps computers understand, interpret and manipulate human language.
- Features of common NLP Workload Scenarios
  - Identify features and uses for key phrase extraction
  - Identify features and uses for entity recognition
  - Identify features and uses for sentiment analysis
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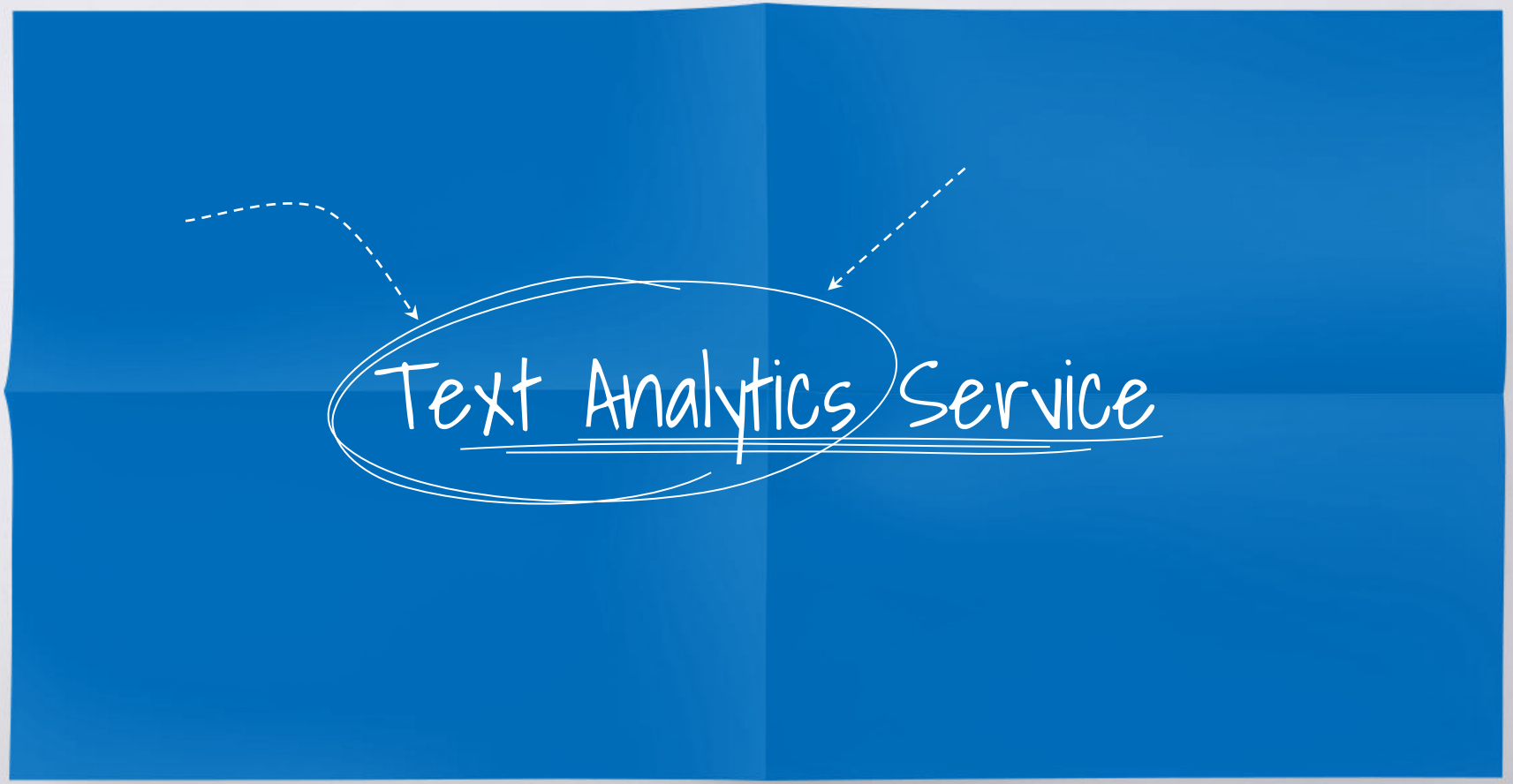
Text Analytics Service

LUIS (Language Understanding Service)

Speech Service

Translator Text Service


Text Analytics Service

Text Analytics Service

- The Text Analytics API is a cloud-based service that provides Natural Language Processing (NLP) features for text mining and text analysis.
- Text Analytics can be used with Power Apps to analyze text, and there is a Text Analytics connector that can be used to call Text Analytics from a canvas app.
- Support features:
  - Language detection: identify the language in which text is written. The service will return NaN when it cannot determine the language in the provided text.

> **Review 1:** "*A fantastic place for lunch. The soup was delicious.*"
>
> **Review 2:** "*Comida maravillosa y gran servicio.*"
>
> **Review 3:** "*The croque monsieur avec frites was terrific. Bon appetit!*"

Document	Language Name	ISO 6391 Code	Score
Review 1	English	en	1.0
Review 2	Spanish	es	1.0
Review 3	English	en	0.9

  - Key phrase extraction
  - Named Entity Recognition
  - Sentiment Analysis

Knowledge Check

1. You want to use the Text Analytics service to determine the key talking points in a text document. Which feature of the service should you use?

- ○ Sentiment analysis
- ○ Key phrase extraction
- ○ Entity detection

2. You use the Text Analytics service to perform sentiment analysis on a document, and a score of 0.99 is returned. What does this score indicate about the document sentiment?

- ○ The document is positive.
- ○ The document is neutral.
- ○ The document is negative.

3. When might you see **NaN** returned for a score in Language Detection?

- ○ When the score calculated by the service is outside the range of 0 to 1
- ○ When the predominant language in the text is mixed with other languages
- ○ When the language is ambiguous

Knowledge Check

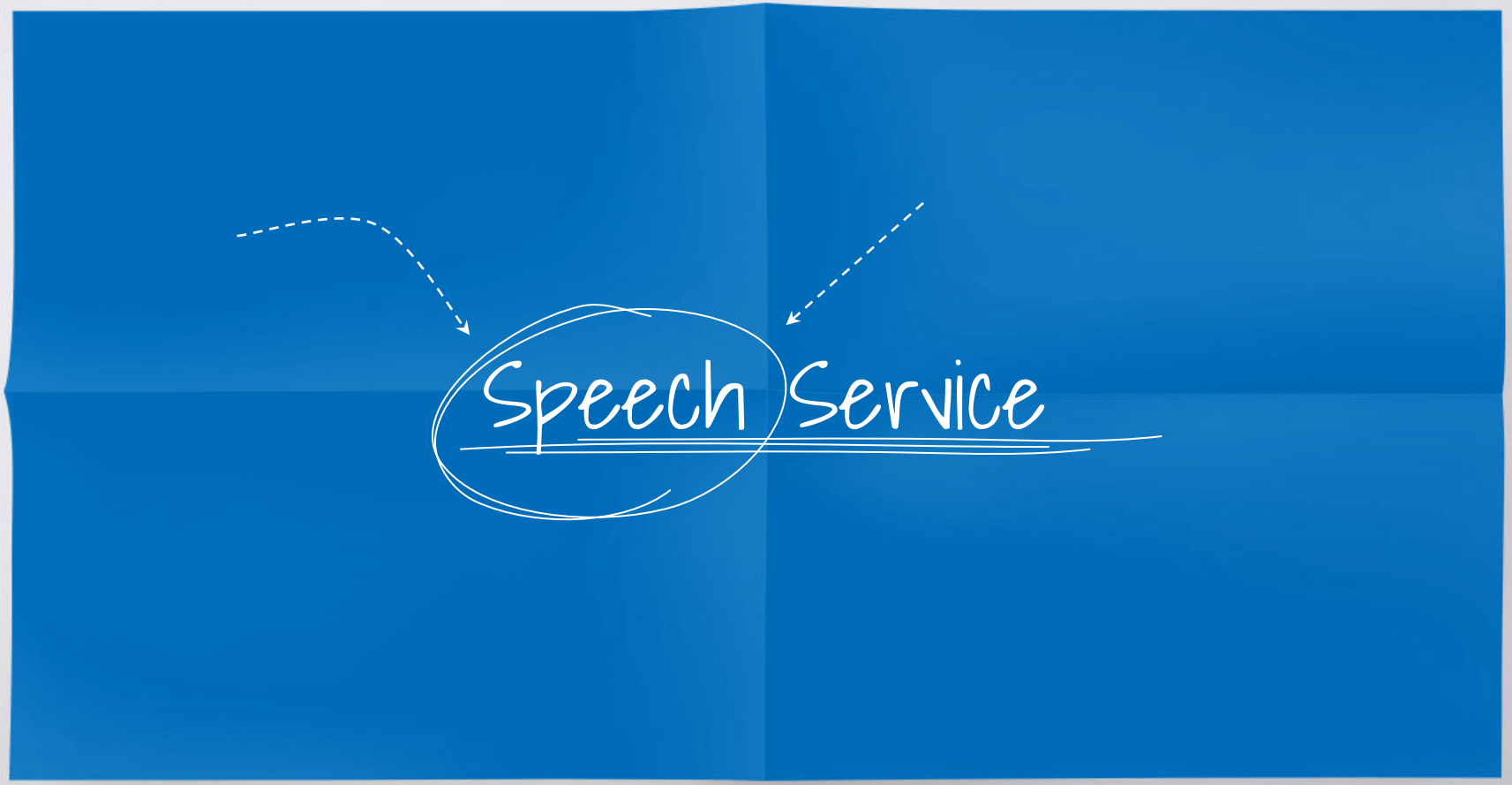
- Question: For each of the following statements about the Azure Cognitive Services Text Analytics service, select Yes if the statement is true. Otherwise, select No.

Statement
The results from the Key Phrases operation in Text Analytics includes a confidence score between 0 and 1.
The Text Analytics API can be used with C#.
Text Analytics can be used by Power App canvas apps to analyze text.

Knowledge Check

- Question: For each of the following statements about the Azure Cognitive Services Text Analytics service, select Yes if the statement is true. Otherwise, select No.

Statement	Yes	No
The results from the Key Phrases operation in Text Analytics includes a confidence score between 0 and 1.	○	◉
The Text Analytics API can be used with C#.	◉	○
Text Analytics can be used by Power App canvas apps to analyze text.	◉	○


Speech Service

Speech recognition and Synthesis

- Speech recognition (Speech-to-text API) is the ability to detect and interpret spoken input and turn it into data so it can be processed as text.
- The model is optimized for two scenarios, conversational and dictation.
- It can be used for both Real-time transcription and Batch transcription
- You can create and train your custom model
- Use Cases:
  - Providing closed captions for recorded or live videos
  - Creating a transcript of a phone call or meeting
  - Automated note dictation
  - Determining intended user input for further processing

- Speech synthesis (Text-to-Speech API) is the ability to generate spoken output by converting text into audio speech.
- Speech synthesis is available in multiple languages.
- It and can be customized to adjust pitch, add pauses, improve pronunciation, etc. by using speech synthesis markup language (SSML).
- It helps people with disabilities, like vision impairment
- Use Cases:
  - Generating spoken responses to user input.
  - Creating voice menus for telephone systems.
  - Reading email or text messages aloud in hands-free scenarios.
  - Broadcasting announcements in public locations, such as railway stations or airports.
- Speech Translation: enables speech-to-text and speech-to-speech translation.

Knowledge Check

1. You plan to build an application that uses the Speech service to transcribe audio recordings of phone calls into text, and then submits the transcribed text to the Text Analytics service to extract key phrases. You want to manage access and billing for the application services in a single Azure resource. Which type of Azure resource should you create?

- ○ Speech
- ○ Text Analytics
- ○ Cognitive Services

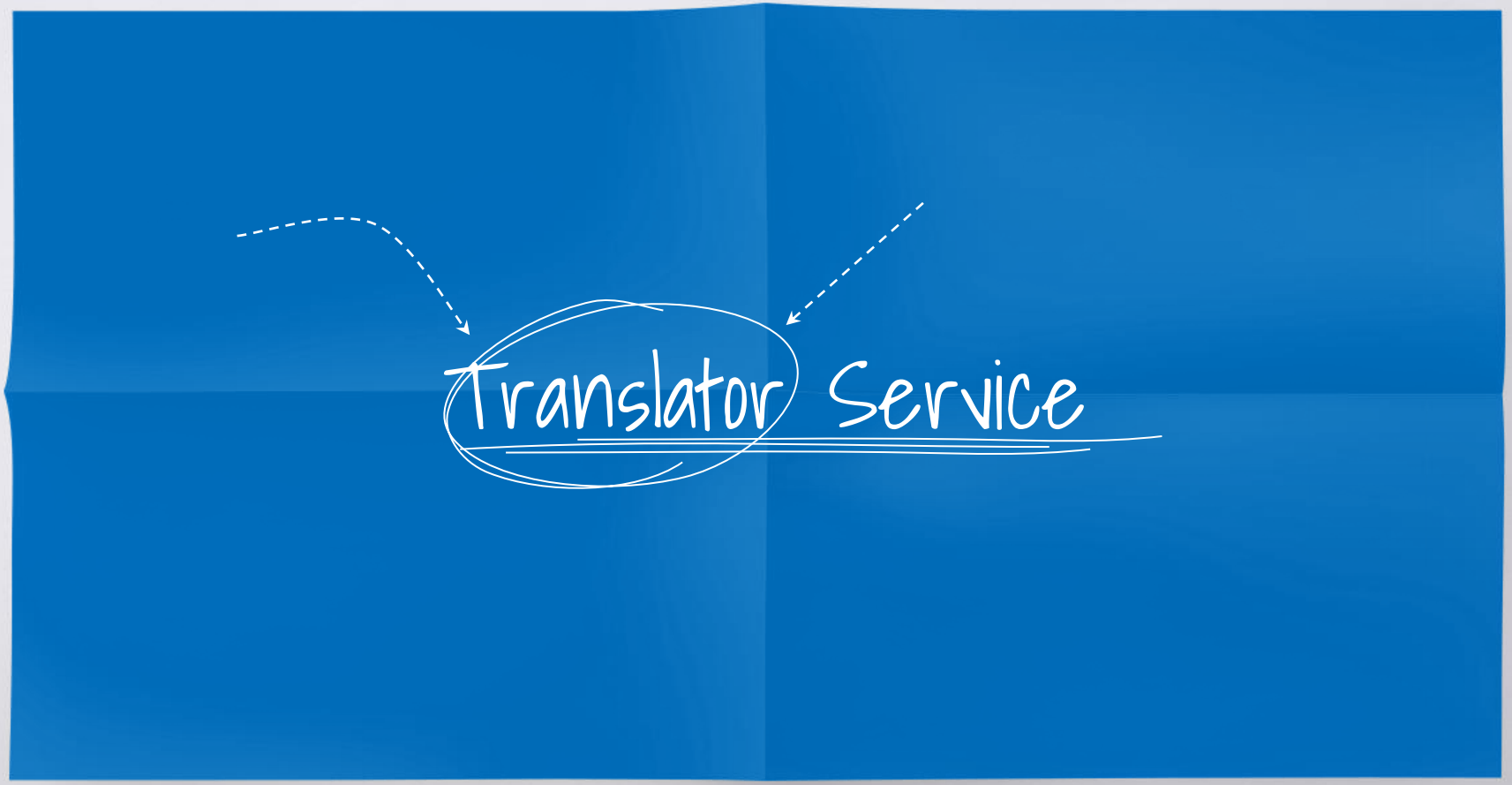
2. You want to use the Speech service to build an application that reads incoming email message subjects aloud. Which API should you use?

- ○ Speech-to-Text
- ○ Text-to-Speech
- ○ Translate

Knowledge Check

- Question: For each of the following statements, select Yes if the statement is true. Otherwise, select No.

Statement
To use the Speech service, you need to build a custom speech model.
The Speech service can transcribe audio streams in real time.
The Speech service can transcribe audio files asynchronously.


Translator Service

Translation Service

- The Translator service translates text from one language to another language in near real-time.
- The Translator service allows you to specify multiple languages, so you can simultaneously translate into multiple languages.
- The Translator service allows you to specify a cultural variant when translating into a language. You append the cultural code to the language code, for example, fr-CA for Canadian French.
- The **Translator Text service**, which supports text-to-text translation.
- The **Speech service**, which enables speech-to-text and speech-to-speech translation.
- The service uses a Neural Machine Translation (NMT) model for translation

Knowledge Check

1. You are developing an application that must take English input from a microphone and generate a real-time text-based transcription in Hindi. Which service should you use?

- ○ Translator Text
- ○ Speech
- ○ Text Analytics

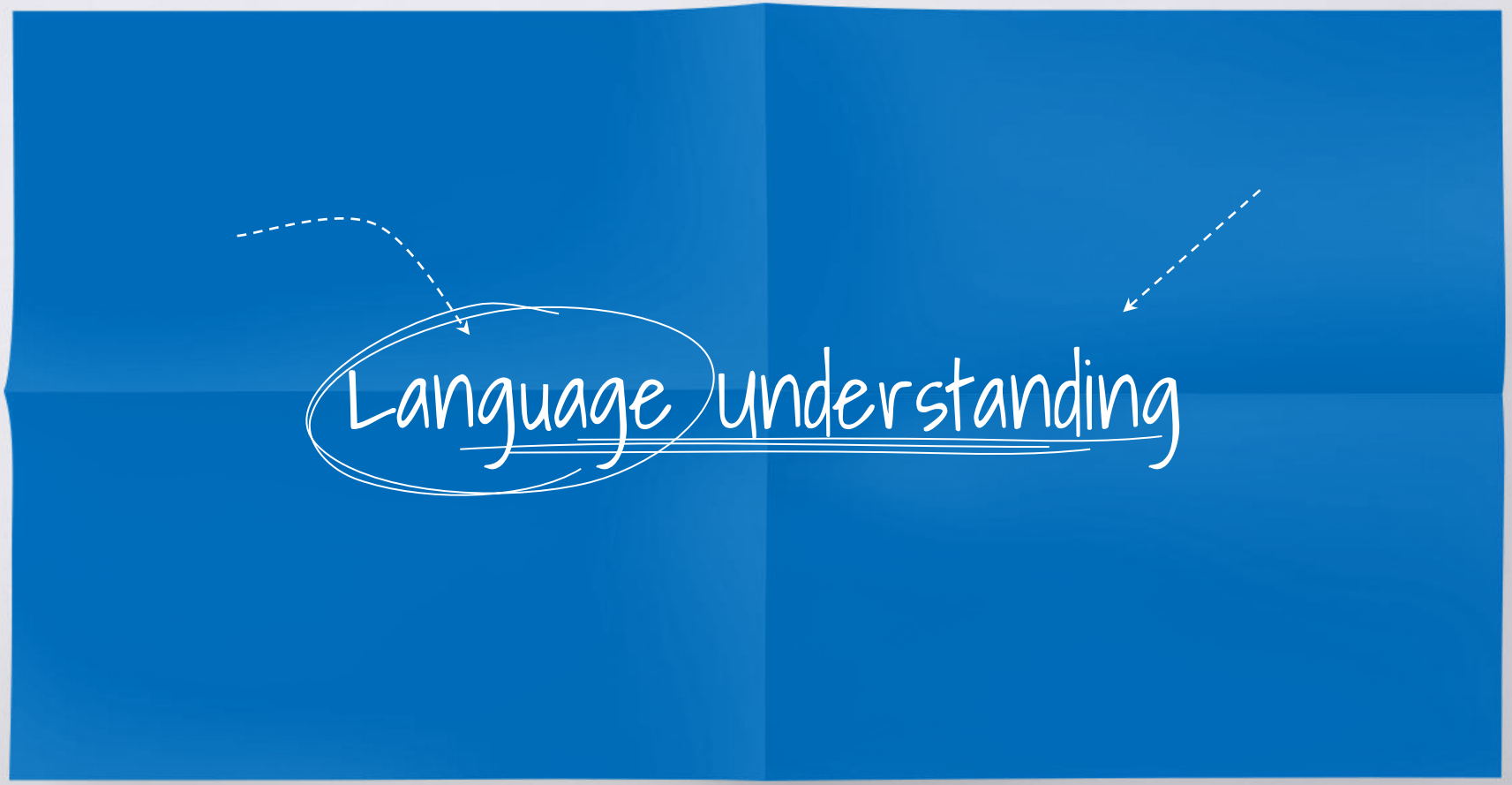
2. You need to use the Translator Text service to translate email messages from Spanish into both English and French? What is the most efficient way to accomplish this goal?

- ○ Make a single call to the service; specifying a "from" language of "es", a "to" language of "en", and another "to" language of "fr".
- ○ Make a single call to the service; specifying a "from" language of "es", and a "to" language of "en-fr".
- ○ Make two calls to the service; one with a "from" language of "es" and a "to" language of "en", and another with a "from" language of "es" and a "to" language of "fr"

Knowledge Check

Question: For each of the following statements about the Translator service, select Yes if the statement is true. Otherwise, select No

Statement
The Translator service uses Statistical Machine Translation (SMT) technology.
The Translator service can simultaneously translate from one language into multiple other languages.
The Translator service supports translation into language variants such as French and Canadian French.


Language Understanding

Language Understanding

- Language understanding extracts the overall meaning from the text.
- The intent and actions expressed in a text are an example of language understanding.
- Common scenarios for this kind of solution include customer support applications, reservation systems, and home automation among others.
- Three core concepts: utterances, entities, and intents
- "Switch the fan on."
- "Turn on the light."
- To use the Language Understanding service, you need two kinds of resource:
- **An authoring resource**: used to define, train, and test the language model. This must be a Language Understanding - Authoring resource in your Azure subscription.
- **A prediction resource:** used to publish model and handle requests from client applications that use it. This can be either a Language Understanding or Cognitive Services resource in your Azure subscription.

Language Understanding

Intent	Related Utterances	Entities
Greeting	"Hello"	
	"Hi"	
	"Hey"	
	"Good morning"	
TurnOn	"Switch the fan on"	fan (device)
	"Turn the light on"	light (device)
	"Turn on the light"	light (device)
TurnOff	"Switch the fan off"	fan (device)
	"Turn the light off"	light (device)
	"Turn off the light"	light (device)
CheckWeather	"What is the weather for today?"	today (datetime)
	"Give me the weather forecast"	
	"What is the forecast for Paris?"	Paris (location)
	"What will the weather be like in Seattle tomorrow?"	Seattle (location), tomorrow (datetime)
None	"What is the meaning of life?"	
	"Is this thing on?"	

Knowledge Check

1. You need to provision an Azure resource that will be used to author a new Language Understanding application. What kind of resource should you create?

- ○ Text Analytics
- ○ Language Understanding
- ○ Cognitive Services

2. You are authoring a Language Understanding application to support an international clock. You want users to be able to ask for the current time in a specified city, for example "What is the time in London?". What should you do?

- ○ Define a "city" entity and a "GetTime" intent with utterances that indicate the city intent.
- ○ Create an intent for each city, each with an utterance that asks for the time in that city.
- ○ Add the utterance "What time is it in city" to the "None" intent.

3. You have published your Language Understanding application. What information does a client application developer need to get predictions from it?

- ○ The endpoint and key for the application's prediction resource
- ○ The endpoint and key for the application's authoring resource
- ○ The Azure credentials of the user who published the Language Understanding application

Knowledge Check

Question: Which two Azure cognitive services can you combine to recognize intents in voice commands? Each correct answer presents part of the solution.

Choose the correct answers

A. Language Understanding
B. Text Translator
C. Speaker Recognition
D. Form Recognizer
E. Speech