Appendices

A Grammatical Transformations

In our experiments, we apply the following transformations to the head **h** and tail **t** of each relational triple before injecting them into the template.

1. If the first word is a noun or adjective, or if the first word is a verb and the second word is a noun or adjective, prepend an indefinite or definite article

2. If the first word is an infinitive verb, convert it to a gerund (i.e. "jump" → "jumping")

3. If the first word is a number, pluralize the following word (i.e. "two leg" → "two legs")

We use the default settings in the spaCy Python library (https://spacy.io/) for identifying the part of speech. We also use pattern (https://www.clips.uantwerpen.be/pages/pattern) for conjugation and pluralization.

B Hand Crafted Templates

We use the following hand-crafted templates for relations in the ConcpetNet database. Each relation is mapped to a list of several templates. Here, {0} refers to the head entity and {1} refers to the tail.

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  "RelatedTo":  [ "{0} is like {1}",
"{1} is related to {0}", "{0} is related
to {1}" ],
"ExternalURL":  [ "{0} is described at
the following URL {1}" ],
"FormOf":  [ "{0} is a form of the word
{1}" ],
"IsA":  [ "{0} is {1}", "{0} is a type
of {1}", "{0} are {1}", "{0} is a kind of
{1}", "{0} is a {1}" ],
"NotIsA":  [ "{0} is not {1}", "{0} is
not a type of {1}", "{0} are not {1}",
"{0} is not a kind of {1}", "{0} is not a
{1}" ],
"PartOf":  [ "{1} has {0}", "{0} is part
of {1}", "{0} is a part of {1}" ],
"HasA":  [ "{0} has {1}", "{0} contains
{1}", "{0} have {1}" ],
"UsedFor":  [ "{0} is used for {1}", "{0}
is for {1}", "You can use {0} to {1}",
"You can use {0} for {1}", "{0} are used
to {1}", "{0} is used to {1}", "{0} can
be used to {1}", "{0} can be used for
{1}" ],
"CapableOf":  [ "{0} can {1}", "An
activity {0} can do is {1}", "{0}
sometimes {1}", "{0} often {1}" ],
"AtLocation":  [ "You are likely to find
{0} in {1}", "You are likely to find
{0} at {1}", "Something you find on {1}
is {0}", "Something you find in {1} is
{0}", "Something you find at {1} is {0}",
"Somewhere {0} can be is {1}", "Something
you find under {1} is {0}" ],
"Causes":  [ "Sometimes {0} causes
{1}", "Something that might happen as
a consequence of {0} is {1}", "Sometimes
{0} causes you to {1}", "The effect of
{0} is {1}" ],
"HasSubevent":  [ "Something you might
do while {0} is {1}", "One of the things
you do when you {0} is {1}", "Something
that might happen while {0} is {1}",
"Something that might happen when you
{0} is {1}", "One of the things you do
when you {1} is {0}", "Something that
might happen when you {1} is {0}" ],
"HasFirstSubevent":  [ "the first thing
you do when you {0} is {1}" ],
"HasLastSubevent":  [ "the last thing
you do when you {0} is {1}" ],
"HasPrerequisite":  [ "something you
need to do before you {0} is {1}", "If
you want to {0} then you should {1}",
"{0} requires {1}" ],
"HasProperty":  [ "{0} is {1}", "{0} are
{1}", "{0} can be {1}" ],
"MotivatedByGoal":  [ "You would {0}
because you want to {1}", "You would {0}
because you want {1}", "You would {0}
because {1}" ],
"ObstructedBy":  [ "{0} can be prevented
by {1}" ],
"Desires":  [ "{0} wants {1}", "{0} wants
to {1}", "{0} like to {1}" ],
"CreatedBy":  [ "{0} is created by {1}"
],
"Synonyms":  [ "{0} and {1} are have
similar meanings", "{0} and {1} are
similar" ],
"Antonym":  [ "{0} is the opposite of
{1}" ],
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"DistinctFrom": [ "it cannot be both
{0} and {1}" ],
"DerivedFrom": [ "the word {0} is
derived from the word {1}" ],
"SymbolOf": [ "{0} is a symbol of {1}"
],
"DefinedAs": [ "{0} is defined as {1}",
"{0} is the {1}" ],
"Entails": [ "if {0} is happening, {1}
is also happening" ],
"MannerOf": [ "{0} is a specific way of
doing {1}" ],
"LocatedNear": [ "{0} is located near
{1}" ],
"dbpedia": [ "{0} is conceptually
related to {1}" ],
"SimlarTo": [ "{0} is similar to {1}" ],
"EtymologicallyRelatedTo": [ "the
word {0} and the word {1} have the same
origin" ],
"EtymologicallyDerivedFrom": [ "the
word {0} comes from the word {1}" ],
"CausesDesire": [ "{0} makes people
want {1}", "{0} would make you want to
{1}" ],
"MadeOf": [ "{0} is made of {1}", "{0}
can be made of {1}", "{0} are made of
{1}" ],
"ReceivesAction": [ "{0} can be {1} ",
"{0} is something that you can {1}", "{0}
can receive {1}" ],
"InstanceOf": [ "{0} is an example of
{1}" ],
"NotDesires": [ "{0} does not want {1}",
"{0} doesn't want to {1}", "{0} doesn't
want {1}" ],
"NotUsedFor": [ "{0} is not used for
{1}" ],
"NotCapableOf": [ "{0} is not capable
of {1}", "{0} do not {1}" ],
"NotHasProperty": [ "{0} does not have
the property of {1}" ],
"NotMadeOf": [ "{0} is not made of {1}"
]
```

C Most Confident Mistakes

Relation	Average Score	Rank
(atomic nucleus, IsA, atom)	1	1

(negative number, HasProperty, positive)	1	13
(pseudonym, CapableOf, real name)	2	16
(the harbour, HasA, island)	2	19
(the substance, HasA, drug)	2.5	20
(plurality voting, HasPrerequisite, majority)	1	22
(function, ReceivesAction, element of a)	0	24
(minister, ReceivesAction, member of parliament)	0.5	28
(bombing, IsA, war crime)	2	33
(prime minister, ReceivesAction, head of state)	0	35
(film, Causes, silent version)	1.5	36
(island, AtLocation, other side)	1.5	37
(subset, ReceivesAction, element of s)	0.5	40
(monarchy, ReceivesAction, form of government)	0.5	47
(law, ReceivesAction, cause of action)	1	48
(weather, UsedFor, heavy rain)	1	49
(example, UsedFor, word processing)	1.5	54
(the violin, HasA, viola)	1	56
(electric charge, HasProperty, magnetic)	2	60
(council, ReceivesAction, form of government)	0.5	65
(credit card, HasPrerequisite, purchase)	1.5	66
(episode, Causes, season finale)	1.5	69
(lake, AtLocation, eastern part)	1.5	73
(overhead cam, UsedFor, engine)	2.5	75
(village, AtLocation, northern end)	1.5	79

(database, IsA, query language)	2.5	88
(character, CapableOf, voice actor)	2.5	89
(plural form, UsedFor, word)	2.5	94
(electric bass, HasA, double bass)	1	96
(voter registration, HasPrerequisite, voting)	1	98

Table 4: Top 100 most confident commonsense knowledge predictions under the sentence-ranking approach ($\lambda = 4$) receiving an average score below 3 from the human annotators in the "Mining Wikipedia" task.

Relation	Average Score	Rank
(the violin, HasA, viola)	1	8
(database, IsA, query language)	2.5	15
(majority party, Causes, majority coalition)	2.5	14
(playoff, Causes, wild card)	1	13
(neutron emission, Causes, fission)	2.5	19
(the target, HasA, velocity)	2	22
(electric bass, HasA, double bass)	1	20
(music video, UsedFor, cameo)	2	24
(engine, CapableOf, second stage)	2.5	27
(site, UsedFor, state park)	2.5	32
(brain, Causes, spinal cord)	2	35
(demand, IsA, marginal utility)	0.5	37
(version, UsedFor, bonus track)	1.5	39
(bombing, IsA, war crime)	2	40
(theorem, AtLocation, of a)	0	45
(airport, HasSubevent, air base)	0.5	38
(prime minister, ReceivesAction, head of state)	0	42

(constituency, ReceivesAction, member of parliament)	0	43
(the harbour, HasA, island)	2	65
(judge, ReceivesAction, contempt of court)	1.5	57
(the city, HasProperty, homeless)	2	72
(instruction set, UsedFor, execution)	1.5	70
(resignation, ReceivesAction, removal from office)	2	68
(the type, HasA, body)	2	83
(team, HasSubevent, head coach)	0.5	61
(resignation, AtLocation, removal from office)	0.5	69
(school, UsedFor, junior college)	2	78
(regiment, ReceivesAction, medal of honor)	0.5	80
(wind power, HasSubevent, energy)	2.5	91
(mayor, ReceivesAction, form of government)	0	89
(episode, Causes, season finale)	1.5	92

Table 5: Top 100 most confident commonsense knowledge predictions under the concatenation approach ($\lambda = 7$) receiving an average score below 3 from the human annotators in the "Mining Wikipedia" task.