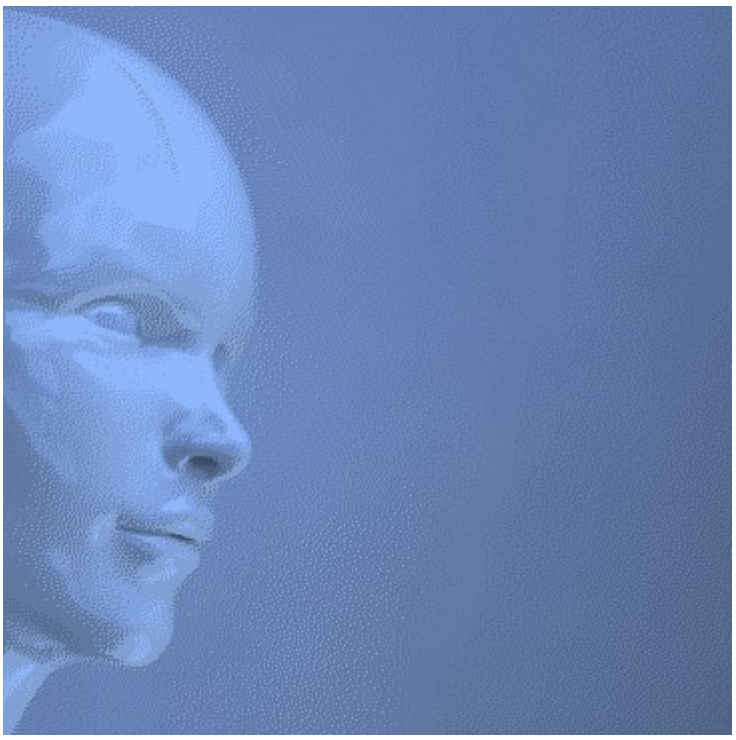
# The Logic of Language

Reverse-engineering the language center of our brain, by using Laws of Intelligence that are naturally found in the Human Language.



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## Introduction

Science concerns itself with observed and observable phenomena. Belief, by contrast, deals with unobserved or unobservable phenomena.

The origin of the universe, the origin of life, the origin of taxonomic families, the origin of natural intelligence, and the origin of human language have never been directly observed. Therefore, these are not scientific conclusions, but belief systems — unless and until the phenomena themselves can be reproduced under controlled conditions, and at scale if required.

Without such replication, these models remain outside the domain of verifiable science.

Unlike the other origins, intelligence and language may be accessible through replication under controlled conditions — software — especially by examining the underlying Laws of Nature.

This document explores how natural intelligence and the human language can be replicated in software by identifying and applying the Laws of Intelligence that are naturally found in the Human Language.

# 1. Fundamental science

This document proposes a fundamental — scientific — approach towards a profound understanding of natural intelligence and natural language based on the Laws of Nature.

## *1.1. Fundamental truth*

There is only one truth in fundamental science: **the way nature works**.

Nature operates in a single, definite order, governed by natural laws. Those who investigate these laws and uncover how nature truly works will find their discoveries confirmed under controlled conditions — and, in time, applied to everyday life. In this way, taxpayers will have a Return on Investment in their funding of science.

## *1.2. Fundamental sciences are closing the circle*

We perceive nothing other than natural phenomena obeying the Laws of Nature, and proceeding according to the Laws of Nature. And we perceive nothing other than natural phenomena closing the circle, as illustrated by the following example of electromagnetism.

The field of electromagnetism is a fundamental science because it closes the circle:

- We can convert light to electricity, and we can convert electricity back to light;
- We can convert motion — via magnetism — to electricity, and convert electricity — via magnetism — back to motion.

### 1.2.1. Cognitive science

The field of Artificial Intelligence (AI) and Natural Language Processing (NLP) — in a broad sense — is mainly studied from the perspective of behavioral/cognitive science, resulting in mimicry of behavior. However, mimicking the behavior of a hen (chicken) does not produce eggs. AI is therefore not naturally intelligent, but the result of human ingenuity.

AI may deliver useful engineered techniques. But humans are the only intelligent actor in AI.

### 1.2.1.1. AI / NLP is unable to close the circle

As a consequence of being investigated from the perspective of cognitive science, the field of AI / NLP is unable to close the circle on natural intelligence and natural language:

- From readable sentences,
- through natural logic (natural intelligence),
- with the result expressed in readable — word-by-word constructed — sentences again.

Illustrated by an example:

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In primary school we all learned a similar sum:

- Given: "John has 3 apples."
- Given: "Peter has 4 apples."
- Logical conclusion: "Together, John and Peter have 7 apples."

The school teacher then wrote:

- 3 apples + 4 apples = 7 apples

However, the result of the sum — "7 apples" — lacks a reference to "John and Peter". So, the result of this sum is insufficient to construct the following readable sentence:

- "Together, John and Peter have 7 apples."

Hopefully, mathematicians will come to the rescue, by closing the circle scientifically:

- J = 3
- P = 4
- J + P = 7

Unfortunately, the mathematical result "J + P = 7" lacks a reference to "apples". So, also the result of this algebra is insufficient to construct a readable sentence. It would require an engineered solution — a specific solution to a specific problem — to come to:

- "Together, John and Peter have 7 apples."

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This is just one example of my scientific challenge. A generic solution to this particular example is described in Block 3.

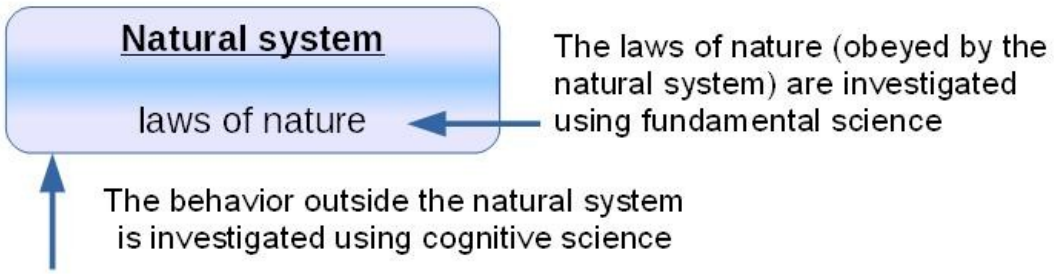
It may seem like Large Language Models (LLM) can solve reasoning problems. However, LLMs only have a limited, engineered reasoning capability. When reasoning problems are combined, LLMs will start to lose context.

Besides that, AI / NLP is lacking self-organizing properties, while our brains do not need help of experts to get their knowledge organized.

### 1.2.2. Fundamental science investigates Logic and Laws of Nature

Intelligence and language are natural phenomena. To close the circle on natural intelligence and natural language, we need to investigate these natural phenomena from the perspective of fundamental science — also known as Basic Research — which investigates Logic and Laws of Nature.

To illustrate the difference with cognitive science:




## *1.3. Pitfalls*

I noticed a few cases of misunderstanding, which will be addressed in the following paragraphs.

### 1.3.1. Self-organization (misunderstood)

Self-organization is often misunderstood. The following 'scientific' paper states:

> "Self-organization refers to a broad range of pattern-formation processes in both physical and biological systems".

However, in this paper, no distinction is made between a **static** 'organization' — which is limited to pattern formation — and a **dynamic** organization, which requires Natural intelligence.

Distinction:

- **Natural pattern formation** — like fractals and the formation of snowflakes — is a static process, based on rules (fractals) or the Laws of Nature (formation of snowflakes);
- **Swarming of birds** is a dynamic, temporary process, based on the bird's instinct. Instinct is an innate mechanism of survival. In case of no danger, swarming is practiced as an emergency drill, while it improves bonding;
- **Self-organization** is a dynamic, continuous process. It is a result of natural intelligence;
- Any other **organization** — like a company or a pack of wolves — is a dynamic, continuous process of multiple intelligent actors.

So, (self-)organization is a result of natural intelligence rather than being the origin.

### 1.3.2. Neurons, intelligence, and learning

A lot of scientists believe that intelligence evolved in brains over a long period of time. But I know: neurons are not essential to intelligence, in the same way as feathers and flapping wings are not essential to aviation.

Learning requires natural intelligence. However, scientists have no clue what natural intelligence is. So-called Machine Learning is therefore unable to learn.

My father taught me: "Don't become a monkey who is trained to perform a trick". Artificial neural networks are trained to perform a trick. As a consequence, they are limited to pattern recognition and pattern generation.

### 1.3.3. Overwhelming evidence… (Santa Claus)

Some people claim there is "overwhelming evidence" for (any variant of) the Evolutionary hypothesis of Common Descent. However, by being selective — by ignoring disconfirming facts — one can also claim there is "overwhelming evidence" for Santa Claus too:

- His address is known: North Pole 1;
- advertisements will forecast his coming;
- if one posts/mails/texts/apps a message, one will get a response;
- then he appears everywhere at once. So, one can meet him in person;
- and presents are given.

But we all know: Santa Claus is just a make-believe. In the same way, the "overwhelming evidence" for (any variant of) the Evolutionary hypothesis of Common Descent is just selective — ignoring disconfirming facts — and is therefore unscientific.

### 1.2.3.4. Boundaries of evolution

We perceive nothing other than boundaries of evolution — as taxonomic families:

- Viruses only produce viruses;
- Bacteria only produce bacteria;
- Fungi only produce fungi;
- Plants only produce plants;
- Insects only produce insects;
- Fish only produce fish;
- Birds only produce birds;
- Monkeys only produce monkeys;
- And humans sometimes produce pigs.

### 1.3.5. Science-washing

Creationists argue that as long as the origin of the universe, the origin of life, and the origin of large taxonomic families cannot be replicated, these questions about origins fall within the realm of belief.

However, naturalists present their beliefs regarding the origin of the universe, the origin of life, and the origin of large taxonomic families as scientific, even though they cannot replicate these beliefs in a controlled environment, even at scale.

Due to this science-washing, naturalists cannot replicate natural intelligence, as their beliefs fundamentally conflict with the way nature — natural intelligence — works.

### 1.2.3.6. Hiding behind historical science

According to naturalism, natural laws and natural forces are sufficient to explain the emergence of the universe, the emergence of life, the emergence of taxonomic families, and the emergence of (natural) intelligence, while there is no need for any involvement of intelligent or supernatural entities.

However, when asked to reproduce the universe, life, taxonomic families, or intelligence, under controlled conditions — at scale if required — believers of naturalism tend to hide behind the term historical science by placing their hypotheses beyond the reach of empirical research in the hope to protect these hypotheses from falsification.

In this way, a paradox is created:

- Either, natural laws and natural forces are sufficient to explain the emergence of the universe, the emergence of life, the emergence of taxonomic families, and the emergence of natural intelligence. In that case, their emergence can be replicated;

- Or, the origin of the universe, the origin of life, the origin of taxonomic families, and the origin of natural intelligence are historical, investigated by historical science. In that case, they could be created by God, by which creation by God should be included in scientific research, regardless of whether naturalism is thereby refuted.

In fact, naturalism undermines itself, by replacing the involvement of an intelligent, supernatural entity (God) with hypotheses that are equally unfalsifiable.

### 1.3.7. Is Christianity anti-science?

Some people believe that Christianity is anti-science, or anti-scientific. However, for centuries, Christian scientists were leading in fundamental science. They sincerely observed the way nature — God's creation — works. As a result, their findings could be reproduced under controlled conditions, after which their findings could be applied to daily life:

- in physics, Isaac Newton and Arthur Compton,
- in chemistry, Robert Boyle and Antoine Lavoisier,
- in electromagnetism, Alessandro Volta, Michael Faraday, and James Clerk Maxwell,
- in mathematics, Gottfried Leibniz, Leonhard Euler, Bernhard Riemann, and Kurt Gödel,
- in genetics, Ronald Fisher, and Gregor Mendel — who is called "the father of modern genetics",
- Charles Babbage — who is called the "father of the computer",
- George Boole — who is called the "father of the digital age" or the "father of binary logic",
- Galileo Galilei — who is called the "father of observational astronomy, modern-era classical physics, the scientific method, and modern science",
- and Johannes Kepler — who is called "one of the founders and fathers of modern astronomy, the scientific method, natural and modern science".

By replicating and applying their findings, these Christian scientists provided a Return on Investment to taxpayers, which we still benefit from today. Their approach of using fundamental science might be useful to investigate natural intelligence and natural language too.

### 1.3.8. Fundamental choice: apes or Adam and Eve?

Any variant of the Evolutionary hypothesis of Common Descent is fundamentally at odds with Christian beliefs. So, only one of both belief systems can be true:

- If man shares a common ancestor with the ape, Adam and Eve never existed;
- If Adam and Eve never existed, the Fall of man — high treason against God — never happened;
- If the Fall of man never happened, the redemption through Jesus is meaningless;
- If redemption through Jesus is meaningless, Christianity is nothing but an empty religion.

So everyone has to make a choice: a common ancestor with the ape, or creation by God.

## 2. The fundamental approach of Thinknowlogy

We perceive nothing other than an ordered universe that is subject to unified, exact, structured, deterministic [1], and consistent Laws of Nature, because we perceive nothing other than natural phenomena obeying the Laws of Nature, and proceeding according to the Laws of Nature [2].

As such, I presume that natural intelligence is enshrined in natural laws too, and proceeds according to those Laws of Nature. So, if one wants to reproduce Natural intelligence — under controlled conditions, and at scale — one has to investigate those Laws of Intelligence.

Being deterministic (=implementable), these Laws of Intelligence might be implementable in artificial systems — through a process of reverse-engineering.

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1 deterministic: "the doctrine that all facts and events exemplify natural laws"

2 I presume that God has created the Laws of Nature to make his creation run like clockwork in a unified, exact, structured, deterministic, and consistent way

## *2.1. Sources of natural intelligence*

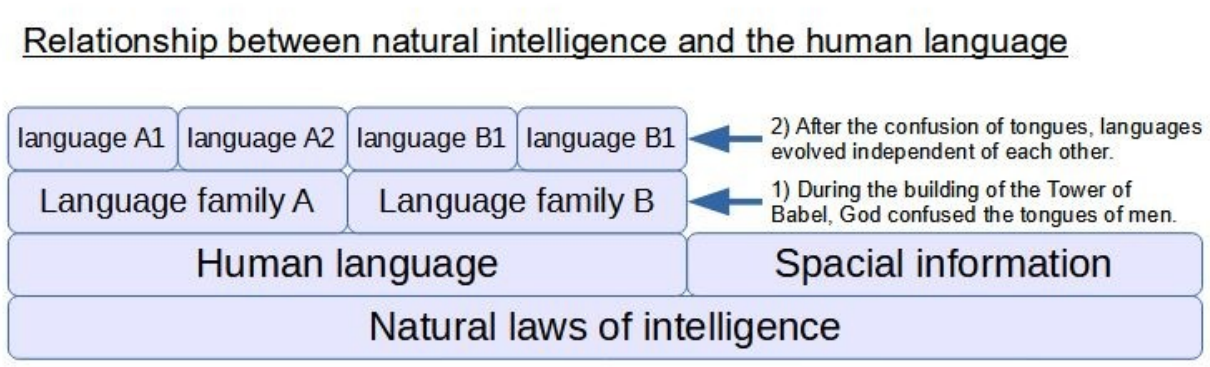
I have identified the human language and spacial information as sources of Natural intelligence, which means that these sources of intelligence provide concrete logic to our brains, by which our brains can organize their knowledge and spatial information:

- Natural language is providing concrete logic for organizing knowledge objects;
- Spatial information is providing concrete logic for organizing spatial objects (used in, e.g., self-driving cars).

I focus on the human language.

Because all natural phenomena are designed in a unified way, natural intelligence and the human language might be related. If so, it must be possible to identify the natural laws that are obeyed by language. After identification, it must be possible to reverse-engineer the way nature works regarding knowledge. In other words: how the human brain is organizing its knowledge.

According to the biblical worldview, life and the universe were all designed once, while no improvements were made afterward. So — if intelligence and language are related — current languages must still obey the same laws of intelligence as were designed in the beginning, regardless of all their differences [3]. Then, current languages still must share the same foundation.




3 The existence of entirely different languages today is explained in the bible: "At one time all the people of the world spoke the same language and used the same words" (Genesis 11:1). During the building of the tower of Babel, God confused the tongues: "Come, let's go down and confuse the people with different languages. Then they won't be able to understand each other" (Genesis 11:7).

## *2.2. Natural intelligence*

To contribute to science, intelligence needs to be defined in a unifying, fundamental (=natural), and deterministic [4] (=implementable) way:

Natural intelligence is the use of naturally occurring logic.

One's goal in using natural intelligence, is to independently:

- Avoid chaos,
- Create order,
- Restore order.

Natural intelligence provides self-organizing properties, by one can independently:

- Group what belongs together;
- Separate what doesn't belong together;
- Archive what is no longer relevant;
- Plan future actions;
- Foresee the consequences that the planned actions will have;
- Learn from mistakes.

More into detail:

- Grouping (combining) of individual or separate objects, to achieve a goal that can not be achieved by either of those objects separately;
- Separating (differentiating) compound or intertwined objects, to clarify the situation, by putting them in their context;
- Archiving of obsolete information, separating current from obsolete information;
- Planning future actions, setting goals, and anticipation of changes;
- Foreseeing possible consequences: Using knowledge and experience to predict possible consequences of planned actions (own plans and planned actions of others);
- Learning from mistakes: Using knowledge and experience to determine the course of a mistake, and to avoid making this kind of mistake in the future.

These capabilities of intelligence can be applied to basic concepts like knowledge objects and spatial objects. Grouping of, for example, numbers, we call: adding. Separating of numbers, we call: subtracting.

4 deterministic: "the doctrine that all facts and events exemplify natural laws"

Deepening:
- Creation starts with grouping;
- Understanding starts with separating;
- Omitting starts with archiving;
- Governing starts with planning;
- Anticipation starts with foreseeing;
- Improvement starts with learning from mistakes.

### 2.2.1. Natural language as an intelligent system

Assuming that natural language is an intelligent system, predictions can be made about the intelligence that will be found in language:
1. Natural language will have self-organizing properties;
2. The sender's brain will add logical clues to the knowledge that is expressed;
3. The receiver's brain will use the logical clues that are added to the knowledge, enabling it to organize the received knowledge.

In all languages, there will be specific words and sentence constructions for:
- Grouping knowledge that belongs together;
- Separating knowledge that doesn't belong together;
- Archiving knowledge that is no longer relevant;
- Planning future actions;
- Foreseeing the consequences that the planned actions will have;
- Learning from mistakes.

### 2.2.2. Self-organization as a property of natural intelligence

Natural intelligence differs from artificial intelligence partly through its capacity for self-organization: the independent and seamless integration of new knowledge into the existing knowledge structure, thereby maintaining its coherence and organization.

### 2.2.3. Natural reasoning in natural language

Almost 2,400 years ago, Aristotle already described a few cases of natural reasoning in natural language — combining natural logic (natural intelligence) with natural language, like:

- Given: "All philosophers are mortal."
- Given: "Socrates is a philosopher."
- Logical conclusion: "Socrates is mortal."

This case of natural reasoning in natural language will be the start of our investigation of finding, unraveling, and replicating God's intelligent design regarding to natural intelligence and natural language.

## *2.3. Laws of Intelligence that are naturally found in the Human Language*

Clues of logic — that are naturally found in the human language — provide information to our brain on how to organize the gained knowledge. The clues of logic include specific words for grouping, separating, and archiving (see definition of Natural intelligence). By using these logical clues — which I call the Laws of Intelligence that are naturally found in the Human Language — we can implement a naturally intelligent, self-organizing knowledge technology similar to the way the language center of our brain works:

- Conjunction "and" has the intelligent function in language to group knowledge (Block 3 and Block 4 of my Scientific challenge);
- Conjunction "or" has the intelligent (Exclusive OR) function in language to separate knowledge (Block 6);
- A definite article (in English: "the") has the intelligent function in language to archive knowledge (Block 7);
- An indefinite article (in English: "a") defines a structure, which has been described scientifically;
- The basic verb "is/are" defines present tense basic logic, which has been described scientifically;
- The basic verb "was/were" defines past tense basic logic (Block 5);
- The possessive verb "has/have" defines present tense direct and indirect possessive logic (Block 1 and Block 2);
- The possessive verb "had" defines past tense — direct and indirect — possessive logic (Block 1 and Block 2, and Block 5).

I am implementing grouping, separating, and archiving as much as possible while leaving the implementation of the remaining capabilities to future generations. These Laws of Intelligence that are naturally found in the Human Language drive a set of structuring algorithms [5] in my system to independently group, separate, and archive knowledge in its knowledge base.

So, natural language provides knowledge — expressed in a certain language — as well as a logical structure of how that knowledge should be organized. This logical structure is (almost) language-independent.

5 algorithm: "any set of detailed instructions which results in a predictable end-state from a known beginning"

### 2.3.1. Example of reasoning: Autonomous generation of questions

Let's put the Laws of Intelligence to work. Or at least, one law:

- Given: "Every person is a man **or** a woman."
- Given: "Addison is a person."
- Automatically generated question: "Is Addison a man **or** a woman?"

How to automatically generate the question mentioned above, using Laws of Intelligence:

- A law of intelligence: Conjunction "or" has the intelligent (Exclusive OR) function in language to separate knowledge;
- Given "Every person is a man **or** a woman" and "Addison is a person";
- Substitution of both sentences: "Addison is a man **or** a woman";
- Conversion to a question: "Is Addison a man **or** a woman?".

### 2.3.2. The function of lexical categories

Nouns, verbs, adjectives, adverbs, pronouns, prepositions, conjunctions, interjections, numerals, articles, and determiners are word classes / Parts of Speech (PoS) / lexical categories.

Lexical categories are essential for reasoning. Consider, for example: "All philosophers are mortal" and "All blue are mortal". Only one of both sentences is grammatically correct, while the other doesn't make sense. So, knowledge technology must always keep track of the lexical category of each word.

Each word of a list of words is usually of the same lexical category. Consider, for example: "Red, white, and blue" and "Red, a sister, and four". Again, only one of both phrases is grammatically correct, while the other doesn't make sense.

### 2.3.3. Autonomy / independently

In the definition of natural intelligence, the word "independently" is used. So, we need to define that word, which is similar to the word "autonomy":

An autonomous system relies on the **consistency** of a natural source, or a **consistent** artificial source, like GPS (Global Positioning System). So, an autonomously intelligent system relies on the consistency of a natural source of intelligence.

AI does not rely on the consistency of a natural source of intelligence. Instead, a lot of human labor is required — like, for example, the fine-tuning of LLMs — and **inconsistent** artificial sources or engineered techniques are used in the background, like, for example, some reasoning or semantic techniques.

### 2.3.4. Universal Grammar theory

In his Universal Grammar theory, Noam Chomsky proposes that the ability to learn a language is hard-wired in the brain, which differs from my fundamental approach:

There is no Universal Grammar, but there are Universal Laws of Intelligence that are naturally found in the Human Language, while logic / algebra / universal reasoning rules on themselves are (almost) language-independent.

When children learn a language, this universal logic in the language center of their brain is 'configured' for a language, which will be their native language / mother tongue. My Controlled Natural Language reasoner works similarly: It implements an (almost) language-independent logic, which is configured for five languages: English, Spanish, French, Dutch, and Chinese.

### 2.3.5. Free will and morality

First of all, morality and free will originate from the bible.

According to the bible, humans separate from animals by having a spirit, which provides humans a free will and a set of morals. Spirits — being supernatural — are, by definition, not bound by the laws of nature. Therefore, spirits can't be captured in machines, which are, by definition, bound by the laws of nature. So, a machine will never have a spirit, free will, and an autonomously controlled set of morals like humans have.

I agree with John Searle on his Chinese room thought experiment, that computers will never have a mind and consciousness:

> "if there is a computer program that allows a computer to carry on an intelligent conversation in a written language, the computer executing the program would not understand the conversation either".

Actually, the Laws of Intelligence only apply to natural intelligence, not to consciousness, morality, or a fee will.

## Testimony: I don't have this wisdom of myself

During my young childhood, God asked me if I wanted to become rich or wise. I chose wisdom [6] because I like the stories about the wisdom of King Solomon.

A few years later, I offered my life to God, as I gave up my own life and desires and fully dedicated my life to Him. Initially, nothing special happened. I became just another Software Tester. I am talented in software testing, but my talent has its limits. I am not a genius.

Over a decade ago, God asked me if I would accept an assignment — a mission of life — to prove naturalism / evolutionism / atheism wrong. If I would accept this assignment, God would provide unique knowledge about His creation of intelligence and language. I accepted. And as promised, God gives me wisdom — insights beyond my knowledge and intelligence — as long as I work on this project. However, if I use the given wisdom for my own good, it will be taken from me. I was explicitly ordered: "Give everything away. Keep nothing behind".

While I was criticizing the current approach to AI and NLP on LinkedIn for not having a (natural) foundation, nor a (natural) definition of intelligence, someone asked me what definition I used. Then I had to admit to myself that I didn't have a definition of intelligence either. So, I prayed and asked for an answer. Ten minutes later, I was able to write down a unifying, fundamental (=natural) and deterministic (=implementable) definition of intelligence, provided by God. Later I also discovered how this definition is related to language through Laws of Intelligence that are naturally found in the Human Language.

6 It wasn't a trick question. Trick questions are not be consistent with the character of God. If I had chosen wealth, I had to give this wealth away like I give away the results of my wisdom now. When God gives such a gift, it doesn't mean you can keep that gift for yourself. It means, you should use it to the glory of God.

# Appendix: Genesis hidden in the Chinese language

The Chinese language is the oldest, continuously written language in the world. It was first written over 4,500 years ago. And some Chinese characters seem to refer to first book of the bible (Genesis). A few examples:

The Chinese character for "to create" consists of four components, and seems to refer to the creation of "Man" – later called: Adam:

- Dust or mud: God has created Adam from dust;
- Mouth or breath: God breathed into the nostrils of Adam;
- Movement or life: Adam became alive;
- Able to walk: Adam was directly able to walk (and to speak).

"*Then the LORD God formed the man from the dust of the ground. He breathed the breath of life into the man's nostrils, and the man became a living person.*" (Genesis 2 verse 7)

(See on YouTube: "Genesis hidden in the Chinese language? Part 2")

The Chinese character for "to covet, to desire" consists of two components, and seems to refer to the Fall:

- Two trees: the tree of life, and the tree of the knowledge of good and evil;
- A woman: "Woman" – later called: Eve – desired the fruit of the only forbidden tree.

(See on YouTube: "Genesis hidden in the Chinese language? Part 3")

On YouTube: "Genesis Code Hidden Within The Ancient Chinese Language", among all:

- The Chinese character for "first" consists of three components: alive, dust, and man. (Adam – created from dust – was the first man to become alive);
- The Chinese character for "to talk" consists of three components: dust, breath/mouth, and alive. (Adam – created from dust – was able to talk);
- The Chinese character for "naked" consists of two components: man and fruit. (After Adam and Eve had eaten the fruit from the forbidden tree, they felt naked);
- The Chinese character for "pain" consists of two components: a piece and two trees. (Pain was a punishment from God for Adam and Eve after they had eaten a piece of fruit from the forbidden tree).

On YouTube: "How Chinese Characters confirm Genesis & Bible stories", among all:

- The Chinese character for "flood" consists of four components: eight, united, earth, and water. (Noah, his wife, and their three sons with their wives, all eight were united in their boat, while the surface of the Earth was flooded with water).