



# A Scientific Explanation of Chapter 13 of the Bhagavad Gita

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# Abstract

The **field** and **knower of the field** of chapter 13 of The Bhagavad Gita are shown to be consistent with our Psychic Field theory mathematically based Clifford Algebra. As the dimension of the later approaches infinity the “highest” of the Gita is approached.

# Introduction - I



[www]

The Gita, as a discussion on religion between the human warrior, Arjuna, and his charioteer Krishna, the guru-Lord, put religion and moral action on a very practical basis, since about 500BC (in written Sanskrit but possibly orally since around 3000BC [Ea1, p. 3]),.

# Introduction - II



[www]

The Gita also contains some fascinating theoretical discussions. Among these is that of chapter 13 on the field and the knower of the field. Although interpretations abound among religious practitioners, we give here a possible one based upon the mathematics of  $n$ -dimensional fields in Clifford algebras.

# Field & Knower

Lord Krishna



[www]

“The Lord said: ‘Son of Kunti, this body is called “the field” and the one who knows it is “the knower of the field.” ’ ’ ”

[Jo1, p. 57, chap. 13, verse 1]

# Field -I

The field is interpreted in different ways by different authors as:

- a) physical body
- b) The Lord
- c) spiritual body  $\implies$  soul

Our interpretation is of body and soul via a mathematical n-dimensional vector field

# Clifford Algebra - I

## Underlying Vector Space

We assume n-dimensional vectors for which a distance metric can be defined:

$$(ds)^2 = (d\underline{x})^{\sim} M (d\underline{x}) \quad \sim = \text{matrix transpose}$$

The fundamental metric matrix M defines the measurement structure on the n-dimensional space. We will use

$$M = [m^{ij}] = \begin{bmatrix} +1 & & & \\ & -1 & & \\ & & \dots & \\ & & & -1 \end{bmatrix} \quad \text{and } G = M^{-1} = [g_{ij}]$$



# Clifford Algebra - II

M is used to define a Clifford algebra of dimension  $2^n$  using basis vectors  $\underline{e}^i$  of the underlying n-dimensional space.

$$\underline{e}^0 = 1, \underline{e}^i = \underline{e}^i, \underline{e}^{ij} = \underline{e}^i \underline{e}^j, \dots, \underline{e}^{12\dots n} = \underline{e}^1 \underline{e}^2 \dots \underline{e}^n$$
$$\underline{e}^i \underline{e}^i + \underline{e}^j \underline{e}^j = 2m^{ij} \underline{e}^0 \text{ which implies}$$
$$(\underline{e}^1)^2 = \underline{e}^0, (\underline{e}^i)^2 = -\underline{e}^0 \text{ if } i \neq j$$

$$\underline{e}^i \underline{e}^j = -\underline{e}^j \underline{e}^i \text{ for the chosen } M$$

Any product of two elements in the Clifford algebra takes the form

$$ab = a \bullet b + a \wedge b$$

where

$$2a \bullet b = ab + ba \text{ and}$$

$$2a \wedge b = ab - ba$$

# Clifford Algebra - III

For the above metric

$$\underline{e}^i \bullet \underline{e}^j = \begin{cases} 0 & \text{if } i \neq j \\ +1 & \text{if } i = j = 1 \\ -1 & \text{if } i = j \neq 1 \end{cases} \quad \underline{e}^i \wedge \underline{e}^j = \begin{cases} \underline{e}^i \underline{e}^j & \text{if } i \neq j \\ 0 & \text{if } i = j \end{cases}$$

Also let for  $i, j, \dots \geq 2$

$$\underline{e}_s^i = \underline{e}^1 \underline{e}^i, \quad \underline{e}_s^0 = \underline{e}^0, \quad \underline{e}_s^{ij} = \underline{e}_s^i \underline{e}_s^j, \dots, \quad \underline{e}_s^{23\dots n} = \underline{e}_s^2 \underline{e}_s^3 \dots \underline{e}_s^n$$

then the  $\underline{e}_s^{\dots}$  span the subspace of all even Clifford algebra vectors. This corresponds to the space subrealm when time is taken as the first coordinate.

The coordinate vector  $\underline{x}$  can now be considered a 1-vector in the Clifford algebra, with the time subrealm of basis vector  $\underline{e}^1$  and the space subrealm of bases  $\underline{e}^2, \dots, \underline{e}^n$  or equivalently  $\underline{e}_s^2, \dots, \underline{e}_s^n$

.

# Psychic Field - I

$x_1 = t$  time

$x_2 = x, x_3 = y, x_4 = z$  (real space)

$x_5, \dots, x_n$  psychic coordinates

$$\underline{x} = \sum_{i=1}^n x_i \underline{e}^i$$

=psychic field position Clifford 1-vector

$$\nabla = \sum_{i=1}^n \partial_i \underline{e}^i = \text{Gradient operator}, \quad \partial_i = \frac{\partial}{\partial x^i} = \text{partial derivative}$$

# Psychic Field - II

## Primary Field Quantities

$$C = \sum_{i=1}^n c_i \underline{e^i} = \text{Clifford 1-vector of psychic sources}$$
$$= \sum_{i=1}^n c_i \underline{e_i}$$

$$E = \sum_{i=1}^n \sum_{j=1}^n E_{ij} \underline{e^i e^j} = \sum_{i=1}^n \sum_{j=1}^n E^{ij} \underline{e_i e_j}, \quad E^{ij} = -E^{ji}$$

= Clifford 2 -vector of psychic excitation field

$$I = \sum_{i=1}^n \sum_{j=1}^n e^i I_{ij} \underline{e^j}$$

= Clifford 2-vector of psychic intensity field

# Psychic Field - III

## Main Field Equations

$$\nabla E = C$$

but

$$\nabla E = \nabla \bullet E + \nabla \wedge E = C$$

Next equate like dimensions

$$\nabla \bullet E = C$$

$$\nabla \wedge I = 0$$

$$I_{ij} = \frac{1}{\lambda \sqrt{|M|}} E_{ij} \quad \text{with} \quad E_{ij} = \sum_{k=1}^n \sum_{l=1}^n g_{ik} E^{kl} g_{lj},$$

# Psychic Field - IV

most useful field variables

partition E, subscripts e

partition I, subscripts i

$F_e$  = psychic excitation field

$S_e$  = soul excitation field

$F_i$  = psychic field intensity

$S_i$  = soul induction field.

$C_p$  = psychic charge density

$C_s$  = soul current density

# Psychic Field - V

Maxwell like equations

$$\underline{\nabla} \bullet F_e = C_P$$

$$\frac{\partial F_e}{\partial t} + (-1)^n \underline{i}_s \underline{\nabla} \wedge S_e = C_S$$

$$\underline{i}_s \frac{\partial S_i}{\partial t} + \underline{\nabla} \wedge F_i = 0$$

$$\underline{i}_s \underline{\nabla} \bullet S_i = 0$$

Here  $\underline{i}_s$  labels the  $2^{n-1}$  th basis vector in the  $2^{n-1}$  dimensional Clifford sub-algebra used to represent the fields in the psychic space subreals while  $\underline{\nabla}$  operates in this same subalgebra and is essentially the last  $n-1$  (psychic space) components of  $\nabla$

# Interpret -I

$$\underline{\nabla} \bullet F_e = C_p$$

The psychic charge,  $C_p$ , excites the psychic realm, setting up the psychic excitation field vector,  $F_e$ . This latter diverges from positive psychic charge and converges upon negative psychic charge; although the sign association is arbitrary, let us take  $C_p > 0$  to represent the male psyche and  $C_p < 0$  to represent the female. In this regard similar genders are attractive with the intensity of attraction inversely proportional to the (n-3)rd power of the distance apart in the psychic space subrealm. Indeed, if an individual has a psychic space location, then it can be assumed that the individual's psychic charge resides at this location from which an excitation field is set up throughout all of psychic space. These field lines terminate upon opposite psychic charges and bend away from like ones; they move in time according to the psychic trajectories of those involved. By orienting psychic charge distributions the excitation field can be directed.



# Interpret - II

$$\frac{\partial F_e}{\partial t} + (-1)^{n_{is}} \nabla \wedge S_e = C_S$$

Movement of this excitation field is equivalent to setting up a soul current vector,  $C_S$ , to initiate the soul excitation vector,  $S_e$ . As the soul excitation curls around one in psychic space it induces a soul current, and conversely, an individual's soul current sets up an enveloping soul excitation field which radiates through psychic space to be felt by others. As the soul excitation vector changes it also changes the soul induction field,  $S_i$ , which is related to it through the metric,  $M$ , of the psychic realm

# Interpret - III

$$\dot{s}_i \frac{\partial S_i}{\partial t} + \nabla \wedge F_i = 0$$

The changes in the soul induction set up the psychic field intensity,  $F_i$ , which curls around any time changes in the soul induction field; since the psychic excitation is also related to the psychic field intensity through the metric, changes in the psychic field intensity are also responsible for the soul current, by the second equation.

# Interpret - IV

$$\underline{\dot{s}} \cdot \nabla \bullet S_i = 0$$

The soul induction field does not diverge from any type of psychic source but that its field lines close upon themselves; in doing so they may change their configuration and travel through psychic space looping other individuals' psychic currents. If the soul inductions of two individuals loop a psychic current in the same direction the mutual effect is additive and we may say that a beneficial relationship is established. If they loop oppositely, then an antagonistic relationship results, while if they fail to loop, the relationship is neutral. Various degrees of looping in either direction are possible allowing for dynamic relationships of all degrees and with any number of individuals.

# Interpret - V

We may say that love is a close coupling of additive soul induction fields, passionate if the psychic charges are opposite and close, while hate is a close coupling of subtractive soul induction fields. Nearness in the psychic realm should yield a more intense relationship, and thus one would expect physical nearness in real space to lend itself to more intense relationships, while, perhaps, as relationships develop the dimension of the psychic realm in which they take place increases. Further, one field may swamp others, so that love overcomes hate (and vice versa), or so that one love is larger than others as far as one of the individuals involved is concerned. Since the psychic media may be anisotropic, nonreciprocal relationships are allowed

# Wave Equation

$$\square P = C$$

$$\square = \nabla \nabla$$

where the wave operator takes second derivatives with respect to the coordinate variables again taking into account the metric of the psychic reals. This wave equation has traveling wave solutions for  $P$ , and hence  $E = \nabla$ , which can move forward or backward in time.

# Knowledge

“Knowledge of the knower and of the field – that is what I consider knowledge.”

[Jo1, p. 57, chap. 13, verse 2]

# Material Nature

“You must know that material nature and the person are both beginningless, and know that the modifications and the constituents also arise from material nature.”

[Jo1, p. 58, chap. 13, verse 19]

$$-\infty \leq t, \text{ all } x_i \leq +\infty$$

□P = C maybe has sources in only the first 4 dimensions?

“Material nature is the reason for cause and effect and agency”

[Jo1, p. 58, verse 20]

# Highest - I

“The highest person in this body is called witness, consentor, supporter, experiencer, the Great Lord, the Supreme Self.”

[Jo1, p. 58, chap. 13, verse 22]

$\implies$  goal of mankind

= union with the Great Lord

= obtain higher & higher dimensions

$\mathfrak{n} \implies \infty$

Point Omega of Teilhard de Chardin

[Ch1]



# Highest - II

“Those with the eye of knowledge thus know the difference between the field and the knower of the field, and the way in which creatures are liberated from material nature, attain to the highest.”

[Jo1, p. 99, chap. 13, verse 34]

□ $P = C$  also has noncausal solutions.

# End Purpose

“Thus I have articulated this most mysterious doctrine, Blameless One, being awakened to this a man may become wise and will have fulfilled his purpose.”

[Jo1, p. 66, chap. 15, verse 20]

# References

[Ch1] Pierre Teilhard de Chardin, "The Phenomenon of Man," Harper and Rowe (Torchbooks), New York, 1965 edition.

[Ea1] E. Easwaran, "The Bhagavad Gita," Nilgiri Press, Pataluma, CA, 1985.

[Jo1] W. J. Johnson, "The Bhagavad Gita, A New Translation," Oxford University Press, Oxford, 1994.

[Ne1] R. W. Newcomb, "Psychic Fields: Basics and Main Ideas," Internal Memorandum, Microsystems Laboratory, Electrical Engineering Department, University of Maryland, November 10, 1977, 14 pp.

[www] many web sites exist; a good one is <http://www.bhagavad-gita.org>

# Historical Note

The author was led to this theory by a study of American Indian legends and interactions with an Osage Indian friend, the constant references to real psychic interactions noted in the daily newspapers where testimonies are frequently seen, and a desire to apply his n-dimensional Maxwell's equations theory developed for the Hungarian Academy of Sciences cold war meetings between East and West.

# Thanks

Sincere thanks to Professor Dutta Roy for suggesting this very fascinating topic.