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An Atomic Product: The Unison Jerk in Drug Transportation

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Abstract

A three dimensional unison product with third derivative of displacement system of differential equations is presented. A projected plasma efavirenz concentration profile of a patient who had been on an orally administered 600 mg daily dose of efavirenz is used as a structural aggregate. A three compartmental model of ordinary differential equations is suggested and solved numerically. The model projects descriptors associated with the product of a bounce that is a closed system. The product consists of three independent phases with two variable states, intenseness (concentration) that measures a structural aggregate and an environmental influence which is gravity. The third phase of the product is a processing function (spartial aggregate) which is a free potential. The function, a free potential, is responsible for ordering the product. A dynamical system with an attractive subspace which is an external potential (stable) with a zero eigenvalue is derived. The unison jerk's Jacobian Matrix has corresponding negative, positive and zero eigenvalues.

Keywords

Jerk, Product Process, Space, Product Structure, Electron, Product Environment, Gravity

1. Introduction

The description of the atom has drawn interest with need for clarity to its functional components, measurement and its state [1] [2] [3] [4]. An atom can be described as a closed system which is a bounce (fourth derivative of displacement). A description of an atom as a bounce is proposed herein. In this work only a product of the bounce's system is investigated. The bounce is generally considered to be a four dimensional aggregate that consists of intention (Control Source (A)), interpretation (Product Function/Process (S)), general intensity

(Product Structure (C)), and environmental influence (Additional Product (P)) [5] [6]. The environment is considered as a structural appendage. Concisely, a bounce is a specified product. A product is governed by the design (control an internal potential) [7].

A bounce is taken as a combination of different paths that have different measures that define advection (a control aggregate), space (a process aggregate), structure (a potency aggregate) and influence (an environmental aggregate). The new analysis of the bounce product is done through proposing a three dimensional jerk (derivative of acceleration) space. A proposed theory defines four different measures, control (measuring advection-a spectral radius measuring the extent of mechanical (product jerk) plate), process (measuring space/free potential), structural (measuring convection/flow potential) and environmental aggregate (measuring the external potential). The aspects of the bounce are independent and are inferred to have different measures. Measurement is taken into account and the paths are suggested to have different aspects of measure. The product has three measures that comprise of an unintuitive (structural) metric, process metric (creation and execution metric) and an intuitive (environmental) metric.

The function state (S) (free potential) is responsible for interpretation or the processing. The two product variable states are an appendage (P) (external potential) and a general state (C) (flow potential). The state (P) (a degree of firmness) is the added aspect of a product and C (degree of mollification or flow tendency) is a structural aspect of the product. A spurious relationship between P and C is suggested. This relationship is suggested to be associated with a confounding process (S) (free potential). In this work, analogies are drawn with space being defined as equivalent to the Gibbs function. The Gibbs function can be defined as the maximum work that can be extracted from a closed system in this case a jerk or bounce. This property was determined by Gibbs in the 19th century when he conducted experiments to predict the behaviour of systems when combined or whether a process could occur simultaneously and spontaneously [8] [9].

A model that only considers the product aspect of a bounce is considered. The product is subdivided into three an organisation (agency or confounder) process, factor and effect. The product agency is a capital, the structural variable is an intermediate product and the environmental influence aggregate an appendage aggregate. This model takes into consideration the three product jerks stimulator (mixing), structure and the hold. There are two signal jerks, the organiser and the flow tendency. The centre is the hold or the gravitational jerk. Time is considered as a distribution and collection path of internal potential's autonomous region (space).

The challenges in understanding drug transportation modelling have been modelled by linear differential equations. The models considered generally consist of describing important parameters that include the absorption and elimina-

tion rate constants. The elimination rate constant describes the rate at which the drug is removed from the system (stability constant) [10].

In this work, we develop a model inspired by the inferred behaviour of the atom to model drug transportation and the associated potential parameters [10]. The space variable is considered herein as a mixing state of the product. The mixing state has two important parameters in relation to the structure. These parameters are associated with the thickening and lessening of the concentration (structure). The elimination rate constant is a stability constant signifying the removal of the drug from the structure to the environment. Instead of an absorption rate constant there is a proposal to have a thickening (extension) and lessening (shrinking) rate constants of the structure measured as a concentration profile of the drug in the plasma.

2. Methods

Projected Pharmacokinetic (plasma concentration-time profile) in a patient on 600 mg daily dose of efavirenz (a drug used in HIV-therapy) is used as a product input (convective aggregate). The hourly projected plasma concentration is for a time period of 94 h and the projected $AUC_{\infty} = 212\ \mathrm{mg}\cdot\mathrm{h}\cdot\mathrm{l}^{-1}$ [11]. The software used, is R and Mathematica.

2.1. Jerk Model

A model that describes the phenomenological description of an atom is suggested. A bounce is described as an atom and concentration as the intensity aggregate (a general product). There are three product states considered herein. The other two product states which are described are a process state which is space and an additional state which is an effect. A complete bounce has a control variable (advection). However in this work we consider a product which can be modelled as a unison jerk J system. The system is modelled by a system of ordinary differential equations. The product jerk is inferred to consist of the three states, that define the stimulator (autonomy), entanglement (tendency) and hold (coverture) (**Figure 1**).

B_{+} *Control Unit-Internal* (*specificity*) *potential*-It is the bounce stimulus, a variable combination (product information). The "spooky action at a distance" is a stimulus. This is a bounce's quality assurance measure. It is an unrestrained/unattached active-signal. It is controlled by the bounce function a space the bounce catalyst. This is the bounce's universal aggregate.

$J_{\odot}$ Product Process: -(*Initial Product-Free* (*Autonomy*) *Potential Prismatic Surface* (Stimulator/Interpreter)) This is a confounding product aggregate a function of the product. Furthermore, it is a conspicuous representation of the accelerator responsible for the re-circulation and separation/shearing signal. The depositing signal of the mechanized matter and is the product capital. This is the unison jerk's initial product (an approach of the product). Space is a product function and "clarifies" the control, it is responsible for the process. This is the bounce's process aggregate.

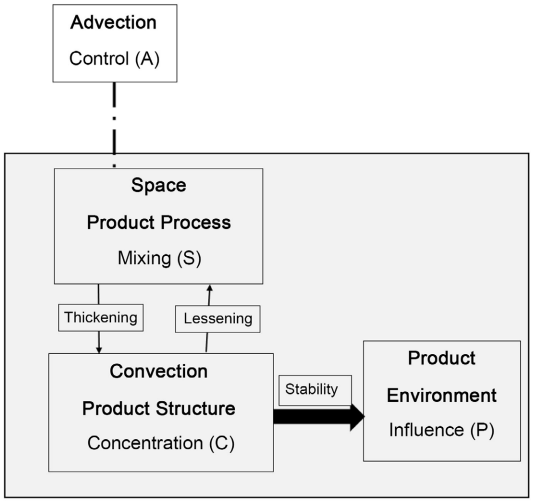


Figure 1. The bounce with the product (Process (mixing state), Structure (structural state) and Environment (conditions state)) states.

$J_{\|}$ Product Structure: -(*Intermediate Product-Flow* (*Tendency*) *potential edge* (illustration/intensification)) A non-intuitive quantity factor, the product's general form an illumination or illustration aggregate. It is the product function an intermediate product. This is a convection aggregate a general aggregate with respect to a product. It is the bounce's probabilistic aggregate. Furthermore, this is an exposure aggregate or mollified state and an entanglement/enfolding extension which is a product-flow. This entangled embedded/mollified state (*advection divergence* (*prismatic general surface*)) is a resulting growth aggregate.

$J_{|}$ Product Environment: -(*Final Product-External* (*Envelope*) *potential edge from the environment*) This is an intuitive quantity effect. It is the product's hold that is a product range. Furthermore, it is a quantitative measure and is a final product. This is the bounce's summative aggregate (*advection convergence* (*prismatic additional surface*)). This jerk's additional potential and is an external impact.

There is consideration of these three paths (product) towards the size of randomised-field (t) a null mechanical plate.

$$\text{Product Process}\left(J_{\odot}\right)=S, \tag{1}$$

$$\text{Product Structure}\left(J_{\|}\right)=C, \tag{2}$$

$$\text{Product Environment}\left(J_{|}\right)=P. \tag{3}$$

The spartial prismal aggregate, a function (process) S is a product's demonstrator and a stimulator signal (a moving boundary jerk). The state P (converging potential) is a product's hold a re-attachment potential (a jerk medium), and C is a product's (diverging potential) sequencing or networking an embedded centre. The prismatic surface S is a controller, an interpreter (product function), C is the entanglement state a product structure (general) state and P is an absolute hold an added state (product appendage) of the bounce. Time is considered

as a distribution and/or collection path of internal potential in free potential. The inter-potential distance between internal potentials in a free potential (spatial-point). An out-process parameter is the extension or thickening of C and an into-process parameter is the shrinking of the state C. The external state an environment is considered as an appendage state or additional state to the general state. The general state C has a more stable additional firm state P and the link is a stiffness/tautness-(Product rigidness).

The product jerk with zero totality displacement is considered;

$$S + \bar{C} + \bar{P} = 0. \tag{4}$$

$$\frac{\mathrm{d}S}{\mathrm{d}t} = -\gamma_{S\bar{C}}\left(S + S_{\infty}\right) + \gamma_{\bar{C}S}\bar{C}, \tag{5}$$

$$\frac{\mathrm{d}\bar{C}}{\mathrm{d}t} = \gamma_{S\bar{C}}\left(S + S_{\infty}\right) - \left(\gamma_{\bar{C}S} + \gamma_{\bar{C}\bar{P}}\right)\bar{C}, \tag{6}$$

$$\frac{\mathrm{d}\bar{P}}{\mathrm{d}t} = \gamma_{\bar{C}\bar{P}}\bar{C}. \tag{7}$$

The parameters are defined as follows:

$\gamma_{S\bar{C}}$ -product extension rate proportional constant,

$\gamma_{\bar{C}S}$ -product shrinking rate constant, and

$\gamma_{\bar{C}\bar{P}}$ -product rigidness/stability rate constant.

The conservative jerk of the system is given by;

$$\frac{\mathrm{d}\ddot{S}}{\mathrm{d}t} = -\gamma_{S\bar{C}}\ddot{S} + \gamma_{\bar{C}S}\ddot{\bar{C}}, \tag{8}$$

$$\frac{\mathrm{d}\ddot{\bar{C}}}{\mathrm{d}t} = \gamma_{S\bar{C}}\ddot{S} - \left(\gamma_{\bar{C}S} + \gamma_{\bar{C}\bar{P}}\right)\bar{C}, \tag{9}$$

$$\frac{\mathrm{d}\ddot{\bar{P}}}{\mathrm{d}t} = \gamma_{\bar{C}\bar{P}}\ddot{\bar{C}}. \tag{10}$$

2.2. Equilibrium Points, Eigenvalues and Eigenvectors Setting

$$\frac{\mathrm{d}\ddot{S}}{\mathrm{d}t} = \frac{\mathrm{d}\ddot{\bar{C}}}{\mathrm{d}t} = \frac{\mathrm{d}\ddot{\bar{P}}}{\mathrm{d}t} = 0, \tag{11}$$

the equilibrium points are given by,

$$\ddot{S}^{*} = \ddot{\bar{C}}^{*} = \ddot{\bar{P}}^{*} = 0. \tag{12}$$

The Jacobian matrix for the field inter-system is given by,

$$\mathbb{J}\left(\ddot{S}^{*}, \ddot{\bar{C}}^{*}, \ddot{\bar{P}}^{*}\right) = \begin{bmatrix} -\gamma_{S\bar{C}} & \gamma_{\bar{C}S} & 0 \\ \gamma_{S\bar{C}} & -\left(\gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right) & 0 \\ 0 & \gamma_{\bar{C}\bar{P}} & 0 \end{bmatrix}_{\left(\ddot{S}^{*}, \ddot{\bar{C}}^{*}, \ddot{\bar{P}}^{*}\right)}. \tag{13}$$

The Jacobian determinant describes the volume dilation in the neighbourhood of a point. The volume dilation at equilibrium is such that,

$$0 = \left|\mathbb{J} - \lambda\mathbb{I}\right|, \tag{14}$$

and is described by the characteristic equation of the field system given by,

$$\lambda^3 + \left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)\lambda^2 + \gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}\lambda = 0. \tag{15}$$

The eigenvalues are given by;

$$\lambda_1 = \frac{1}{2}\left(-\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right) - \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}\right), \tag{16}$$

$$\lambda_2 = \frac{1}{2}\left(-\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right) + \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}\right), \tag{17}$$

and

$$\lambda_3 = 0. \tag{18}$$

The associated eigenvectors are given by;

$$e_1 = \left\{u^-, v^-, 1\right\}, \tag{19}$$

$$e_2 = \left\{u^+, v^+, 1\right\}, \tag{20}$$

and

$$e_3 = \left\{0, 0, 1\right\}, \tag{21}$$

where u^-, v^- are given by;

$$u^- = \frac{\gamma_{\bar{C}S} - \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}} - \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}}{2\gamma_{S\bar{C}}}, \tag{22}$$

$$v^- = \frac{2\gamma_{\bar{C}\bar{P}}}{-\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right) - \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}}, \tag{23}$$

$$u^+ = \frac{\gamma_{\bar{C}S} - \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}} + \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}}{2\gamma_{S\bar{C}}}, \tag{24}$$

$$v^+ = \frac{2\gamma_{\bar{C}\bar{P}}}{-\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right) + \sqrt{\left(\gamma_{\bar{C}S} + \gamma_{S\bar{C}} + \gamma_{\bar{C}\bar{P}}\right)^2 - 4\gamma_{S\bar{C}}\gamma_{\bar{C}\bar{P}}}}. \tag{25}$$

3. Results

Product Jerk: Parameter Estimation, Equilibrium Points, Eigenvalues and Eigenvectors, and Numerical solutions

This work investigated a proposed dynamical system that models the product as a three dimensional jerk. The three product states are given for interpretation *S*, structure *C* and an environmental influence *P*. In the absence of a control variable (*A*), a model that considers jerks is suggested. The dynamics and solutions of the product were determined from the system of differential equations. In general, for pharmacokinetic and pharmacodynamic models, an important parameter that relates clearance and volume (the elimination rate constant) is considered and in this case is defined as the product rigidness rate constant [11]. It is a constant that relates the general (structural) state of the product and the appendage (environmental) state. The projected hourly concentration in a 94 hour time period is used. The concentration aggregate is the general variable to obtain the parameter estimates (Table 1) of Equations (5)-(10).

Table 1. Parameter estimates in modelling transportation rates of the product model.

Parameters	Estimate	Std Error	t value	$Pr(>\|t\|)$
S_{∞}	91.67mg	*Fix*	-	-
$\gamma_{\bar{C}\bar{P}}$	0.4325	1.729×10^{-9}	250131977	$<2 \times 10^{-16}$
$\gamma_{\bar{C}S}$	−0.7096	2.607×10^{-9}	-272247682	$<2 \times 10^{-16}$
$\gamma_{S\bar{C}}$	−0.03145	2.932×10^{-10}	-107269891	$<2 \times 10^{-16}$

The numerical solutions of the depositing bounce's traces, that is for the product function path (S), a product's structural path (C) and (P) a product environmental's path are shown (**Figure 2**).

The equilibrium points, eigenvalues and eigenvectors are;

$$\left(S^*, \bar{C}^*, \bar{P}^*\right) = (0,0,0), \tag{26}$$

$$\left(\lambda_1, \lambda_2, \lambda_3\right) = (-0.0391233, 0.347673, 0), \tag{27}$$

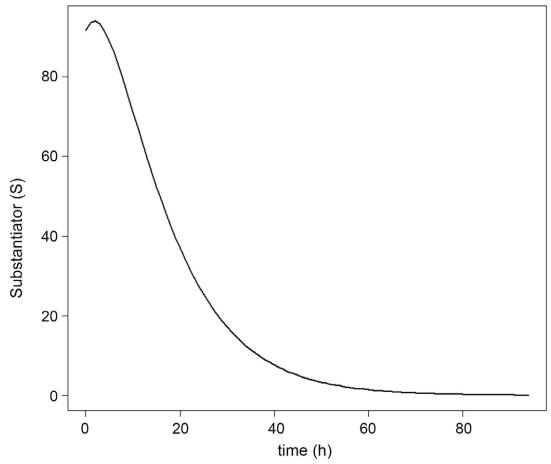
and

$$\begin{aligned}\left[e_1, e_2, e_3\right] = \Big[&\left(-9.094585\times10^{-5}, 1, -9.04585\times10^{-6}\right),\\ &\left(1.80387\times10^{-4}, -1, -8.03869\times10^{-5}\right), (0,0,1)\Big].\end{aligned} \tag{28}$$

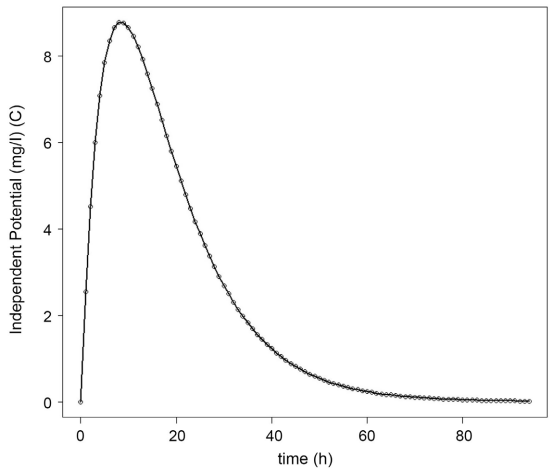
4. Discussion

The product rates for the patient considered herein, in magnitude have a larger shrinking rate than the extension rate. The stability rate is however larger than the extension rate but smaller than the shrinking rate. These results are pointing to the importance of the elimination (stability) rate constant as a parameter that describes robustness of product in the accumulation of a drug in plasma [10]. The eigenvalues for the unison jerk system are real. The eigenvalues show that the product unison jerk's equilibrium point is a saddle [12]. The zero eigenvalue corresponds to a stable external potential. It is the attractor subspace, a gravitational jerk. This work attempts to interpret and define projected phenomenon of a product of the drug movement in terms of a jerk system. Furthermore, it attempts to establish clarity of concepts in modelling drug transportation. This work considers the product without the "spooky action at a distance" that is advection of the bounce control variable. The control is controlled or stimulated by the space or process function [7]. The control is potentially an activated neutron.

An inference here-in points to a product structure (electron) as a "wave" (less stable) and its environment (environmental surface) as its particle (additional/final state) state. The electron can be considered as the "velocity trace of the environmental surface" thus it's an unintuitive aggregate. Proton is potentially the additional state (environmental surface) of the atom and is an accelerating trace state of the position of the environmental volume. A structure is thus a jerk of the position of an environmental volume. This is a volume under the influence of the environmental surface P.



(a)



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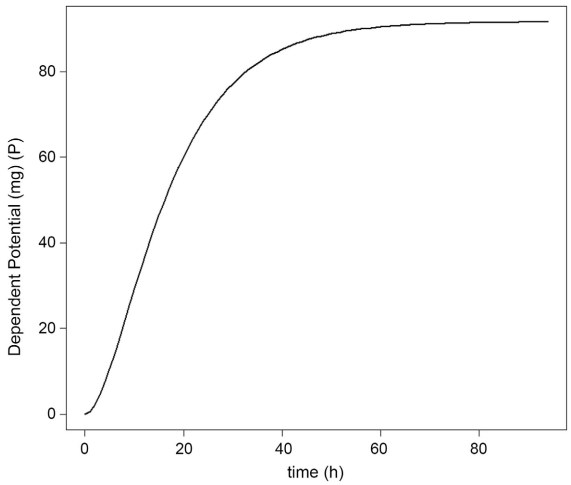

(c)

Figure 2. The three product states' numerical solutions of a bounce. (a) The Product Process: The free (process) potential path showing the nature of bounce spontaneity with initial activation and then reaction. (b) The General Product: A flow/structural potential showing a mono-modal peak. (c) The Appendage Product: A gradual accumulation of the drug on the bounce from the environment (environmental potential).

A product is inferred to consist of three phase components, its organisation or process (space), structure/network (openness) and holding (closure). Time is defined as a path of internal potential in its space. The electron is inferred to be a product's independent state and the proton the product's dependent state. The proton is potentially an attractor an environmental phase. The neutrino potentially is the process function unit of a product confounder or the catalyst of an interpreter [5] [6] [7].

Gravity, strong, weak and electromagnetic phases are external, free, internal and flow potentials respectively [5]. The potential neighbourhood "phase density" of the bounce is inferred to be such that $\rho_{Envelop} > \rho_{Tendency} > \rho_{Autonomy} > \rho_{Specificity}$. There are new interpretations of existing data that space is the autonomy of the bounce a function's point and is responsible for interpretation (work aggregate) of the bounce. The bounce consists of a one dimensional source and a three dimensional product. The space is suggested as a free potential and the capital form of the product. It alters (potentially reversible) the general state that is convection (C) in nature to a rigid phase that results in an additional state (P).

The bounce specificity (Advection) measures the definiteness and the bounce autonomy (Subtantiator or System) measures the free process. Furthermore, the bounce tendency (Susceptibleness) (C) is a probabilistic or intenseness measure and bounce coverture (Settlement) (P) which houses the bounce and is a summative or influence measure.

The three product phases are capital, intermediate and final. The product capital (organiser) is an initial product, it is responsible for shearing and separation of the control into a product. It is responsible for catalysis of information from the control or source into the other three phases. The intermediate product (product structure) is considered as an actualisation or bodily form's signal in the mechanical jerk. This is a product factor of an exposure aggregate. The model suggested the product jerk with the sequence and organisation as signals. A product holding (product effect or environment) is a territory of influence. This is a bounce's aftermath.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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