A system of gears on this specially modified version permits backward motion of the pedals to produce forward motion of the bicycle. Forward (normal) motion of the pedals also moves the bicycle forward. The rider proceeds by rocking backwards and forwards on the pedals, which can be done without bending the knees.

sufficient manual ability, for instance, could depress large keys, but a child with poor arm- and hand-control would use a light-sensitive input device.

The large number of symbols in the system – some 100 to 500 or more – creates the need for new devices to manipulate the symbols for communication. Under an NRC program designed to carry forward the development of laboratory initiated projects to an eventual marketable product, a microprocessor-based graphics generator is being developed by Norpak Ltd. of Pakenham, Ontario, which will display the Blissymbol messages on a conventional home television screen.

This equipment will permit a child to build up a message at his own speed, selecting the symbols one at a time and displaying them in a normal left-to-right sequence on the TV screen where they are held for others to read. At school, a child could also "write" his answer to a question on a large TV monitor at the front of the classroom, or persons could send Blissymbol messages to each other over the telephone.

The device will be a completely self-contained communication aid, accepting a variety of methods of operation – joysticks, push buttons, etc. An alphanumeric mode is also provided for those who have progressed to an alphabetic language. In this mode, a teletypewriter or similar device can be connected to give printed copy, turning the system into a typing aid. Alternatively, a synthetic speech module can be connected, giving audio reinforcement to the Blissymbols. A preproduction model has now been built and field trials are currently being carried out at three Canadian centres.

Over the years, a long line of devices have been developed for children and adults alike by a Council scientist (blind since childhood himself) to assist the blind in almost every area of daily living. Many can now be gainfully employed as computer programmers and in recording studios and photographic or electronics laboratories with the substitution of tactile or audible signals for visible "read out".

Cart lets kids explore

In order to explore his environment – to find out what makes things "tick" – a child must be able to move from one place to another. This stage in the child's development usually begins at about seven to nine months. But the child with a physical ailment – especially if it affects the spine – is severely restricted and often, unable to crawl around, spends this crucial phase of his life lying in his crib.

The Caster Cart, developed in collaboration with the Ontario Crippled Children's Centre of Toronto, for children from nine months to two years, not only enables them to explore at floor level with their peers, but also provides them with the motivation to move from place to place and thus develop a measure of independence.

At the same time, the child's hands are free for bilateral functional activities rather than being used for balancing. In addition, the Cart helps increase sitting balance and strengthens the upper limbs and trunk. It can be used either before a bracing device is fitted or in conjunction with one. Children can easily propel it with their hands by pushing on the large wheels, and it is directed into a turning position by the swivel caster. A detachable handle enables parents to wheel the child indoors, or outdoors to parks or shopping centres. Donlee Plastics, manufacturers of plastic toys, designed the mold for the first preproduction units of the cart which were completed last summer (also under an NRC contract). Cost *per* unit is expected to be about $75.

Children with learning disabilities (it is estimated that from five to 20 per cent of Canada's student population has some

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Bruce Kane, NRC photos

Children can easily propel the Caster Cart (resembling the Big Wheel) with their hands by pushing on the large wheels, and it is directed into a turning position by the swivel caster.